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NOTES ON THE BIOLOGY OF GYNACANTHA NERVOSA RAMBUR (AESCHNINÆ), A CREPUSCULAR DRAGONFLY IN GUATEMALA

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One of the most interesting dragonflies found in Guatemala is *Gynacantha nervosa*, a large somber brownish species (Fig. 1, male) with some green markings particularly at the base of the abdomen and on the back between wings that expand to somewhat more than four inches. Light and airy, with a slender body and wings relatively ample, it is well fitted for a very rapid flight. Appearing mainly towards dusk and at dawn, *Gynacantha* passes the bright hours of the day in some shady wood or in areas under cultivation, among sufficiently dense plant growth, resting alertly head up, its clawed feet gripping some leaf, twig or other support. Sometimes a dull sky will tempt it from its place of concealment earlier than usual, but it is sure to be seen towards sunset a little before the bats and nocturnal insects bestir themselves, remaining on the wing until the fireflies are twinkling in the gathering obscurity. It is seen to less advantage at sunrise.

During one of my earliest sunset walks alongside a small field planted to several varieties of sugar cane, a few of these dragonflies were observed flying low and in a swift undulatory manner over a narrow and then unusued irrigation ditch that hugged the edge of the field. Now and then one of these insects would dart upwards and then descend to its "beat", or another would steal between the cane rows, while another still, rising in air, would pursue its rapid wavy course over the cane tops and into the fading sunset. From time to time and with some difficulty a specimen was captured, for purposes of identification, by a scoop of the net from the rear. In my observations extending from April to July, 1934, at El Salto, Escuintla, no other species of crepuscular dragonfly was noted. Other species

of Æschnine dragonflies that fly about during the day frequently remain on the wing until dusk when many small insects are flying about. In this subfamily, to quote G. Ting-wei Lew (Ent. Americana, XIV, 1933, page 42), "The enlargement of the eyes reaches its maximum development". In the family Libellulidæ we find the species of *Neurocordulia* (Corduliinæ) of crepuscular habit.

Besides patronizing the edge of the cane field, *Gynacantha* was seen patrolling many other places. Several individuals were observed flying over a stream to which they were most probably attracted by the small mayflies (Ephemerida) that were rising slowly and steeply from it. Along an open trail some half dozen of these dragonflies were flying back and forth concentrating about an area when a nuptial flight of small ants was taking place. The insect may also fly at some height alongside trees that skirt a wood, and not infrequently appears about verandas if food is there available. Early in the evening of April 24, 1934, several of these dragonflies were flying about the peak and end wall of a building. They were evidently preying upon winged termites that issued in numbers from the wall, seizing these weakly-flying insects and eating them on the wing so that a thin shower of termite wings floated to the ground. A few days later, observations were made on the early morning flight of this dragonfly. May 1, at 5:21 a. m., I saw my first *Gynacantha*, an obscure gray object flying low over the running water of the little ditch alongside the cane field. At 5:35 in the pink dawn, the sun's rays were just striking the three great volcanic peaks of Agua, Fuego and Acatenango. At 5:44 a female *Gynacantha* was flying about as if seeking a place to lay her eggs. Sunrise over the adjoining meadow revealed innumerable little insects, many of which were ants, swarming in the air and from time to time large dragonflies, of which some were apparently *Gynacantha*, zigzagged swiftly among these insects.

By visiting the margin of the cane field, evening after evening, a few *Gynacantha* were observed inserting their eggs in the ditch bank. Several eggs were thus obtained and one dragonfly thereby reared to maturity. A female about to oviposit is very wary, and a note of April 18, will well illustrate this point. At 5:57 p. m. a *Gynacantha* was cautionsly inspecting an area along the small waterless ditch that bordered the cane field. She

flew back and forth over this space, hovered with motionless body, darted forward and hovered again. Finally, alighting in the side of the ditch, she curved the abdomen forward and beneath her and applied its extremity to the soil. She remained working thus with outspread wings for less than a minute when, notwithstanding my caution and ample distance, she dashed off. At another date when the ditch contained flowing water, one was observed laying her eggs in soil well above the water line.[1] The several female *Gynacantha* caught in the field all had their long superior anal appendages broken. This is probably done during oviposition, when these rather delicate processes are pushed against the soil while the slender sword-like ovipositor and the two-pronged fork beyond it are digging the egg cavity. The reared specimen had these superior anal appendages perfect (Fig. 6, A). The egg (Fig. 4) before it is deposited is clear yellow and somewhat finely roughened; when in the ground it may have a somewhat duller finish. It is about 2.25 millimeters long, slightly bent, with one extremity more tapering than the other.

[1] Williamson, E. B, (Univ. Mich. Mus. Zool., Misc. Publ. No. 9, 1923) on page 42 mentions the oviposition of *Gynacantha nervosa* in Columbia.

Fletcher, T. B. (Rep. Proc. Fourth Ent. Meet. Pusa, 1921) on pages 270-271 describes the oviposition of *Gynacantha bainbriggei* Fraser in Assam. In the evening he saw several of these insects ovipositing in the bank of a small culvert, the bank being "at most slightly moist" and "It should be added that there was no water in this culvert and there certainly can only be water here when it rains, and the nearest standing water was distant over one hundred yards." Dr. Fletcher's figures of the anal segment of the female *Gynacantha* greatly resemble those of the Guatemalan species and they likewise show the superior appendages broken.

It seems that some other Æschnine dragonflies that are dayfliers or crepuscular, approach the manner of oviposition of *Gynacantha*. A note by Dr. Annandale transmitted by F. F. Laidlaw (Rec. Indian Mus., XXII, 1921, pages 88 and 89), referring to the oriental *Æschna ornithocephala* McLachl., reads thus in part: "A number of females were observed ovipositing (in October, after the rains) in a tank of fairly dry earth at the edge of the lake one or two feet above the water level."

Three eggs were located in a bit of soil in which *Gynacantha* was seen working and in all four eggs were found; the three on April 7 and the fourth on April 17. One of these eggs soon decayed; the others were kept in the soil for a time and then immersed with soil, in water. When this material was examined on May 5, a tiny dragonfly larva with a pale cross-like pattern on its head, and apparently in the second stage, was found. This individual, together with a larger one taken from a small pool, were raised to maturity. The larva secured from the egg transformed on June 21 into a nice large female measuring 116 millimeters across outspread wings. Like the more grown field specimen it was relatively quiet in its larval stages, though capable of swift movements, and could squirt a drop or two of water from the apex of its body for a considerable distance in the air. At first it was fed chiefly the larvæ of aquatic diptera, i.e. mosquito wrigglers, but more particularly those of the bloodworm type (Chironomidæ); as it increased in size it devoured with avidity tiny fish so numerous in the streams and reservoirs. Not all its moults or instars were noted. What appeared to be the second moult from the prenymphal stage took place by May 9, when it measured nearly six millimeters in length. Its somewhat ashy gray shade was relieved by dark-banded legs and a pale line inwards from each eye that joined at the middle line, was extended along the top of the thorax and was diffused along the abdomen, which, with other parts of the body, was varied by pale and dark marks. The sides of abdominal segments 7-9 were armed with a distinct backward-projecting spine, also represented, though feebly, on segment six. Other moults noted took place on May 20, 24 or 25 and finally the last one on May 31 or June 1. Immediately after each moult the insect is very pallid, but it soon assumes the brownish shade variegated by lighter and paler marks and with the legs dark-banded. In form much like *Anax* but rather more slender, it is a much quieter larva than those of the *Anax* with which I am acquainted. (Fig. 5, final exuvium.) At last it reaches a length of about 40 millimeters. Soon we see indications of approaching emergence in the swollen wing pads and thorax above. It takes no nourishment during the last several days of its larval life and assumes more of a wood-brown shade. About midday June 15, it had

reversed its customary head down position on a submerged twig, its head now being partly out of water. More and more it made use of the large thoracic spiracle for breathing. On later occasions it appeared to have issued quite or nearly out of water, but the time evidently not being ripe for the moult to maturity, it had reversed its position and was again found head down and partly in water. Finally on June 19 it was found entirely out of water, though but a few millimeters above it. As far as I could watch the larva, it maintained this head-down, out of water position for about 24 hours (June 19-20). On the night of June 20 it crawled out to the extremity of the twig and there awaited transformation. When I examined it at 1:43 a. m. the following morning, June 21, it had rather lately emerged, for pale and tender, it clung to the empty shell, its abdomen still a little thick, its wings of glassy silver and as yet held close together over the back. By dawn its silvery wings were in the usual horizontal position and at 6:55 a. m., when I disturbed it, the insect still clung to its exuvium. Thus development from egg to adult required about two and one-half months.

The specimen taken as a partly grown larva in a small pool also grew rapidly under the influence of sufficient food, and its final transformations were observed with more success than in the case of the egg-reared individual. As far as noted, it remained quite out of water in a head-down position for somewhat more than two days. I finally poked it so that it went completely under water but in less than five minutes had reversed its position and crawled upwards so that on my return from dinner an hour later it had gained the extremity of the twig and was hanging from its underside. It went through several movements, including violent twitchings or writhings, as if to free its adult body from the hard larval case. It also "muscled up" with its legs. A swelling at the base of the abdomen beneath became apparent. Shortly after half past twelve a. m. the top of the thorax split, and head and thorax of the adult insect swelled through this enlarging fissure so that it was soon hanging head downwards by the base of the abdomen. A wriggle or jerk of the body now and then and some movement of the folded legs and at last, at about 1 p. m., the emerging insect suddenly bent upwards and grasping the shell at the empty head and thorax pulled its abdomen out of its encasement. An

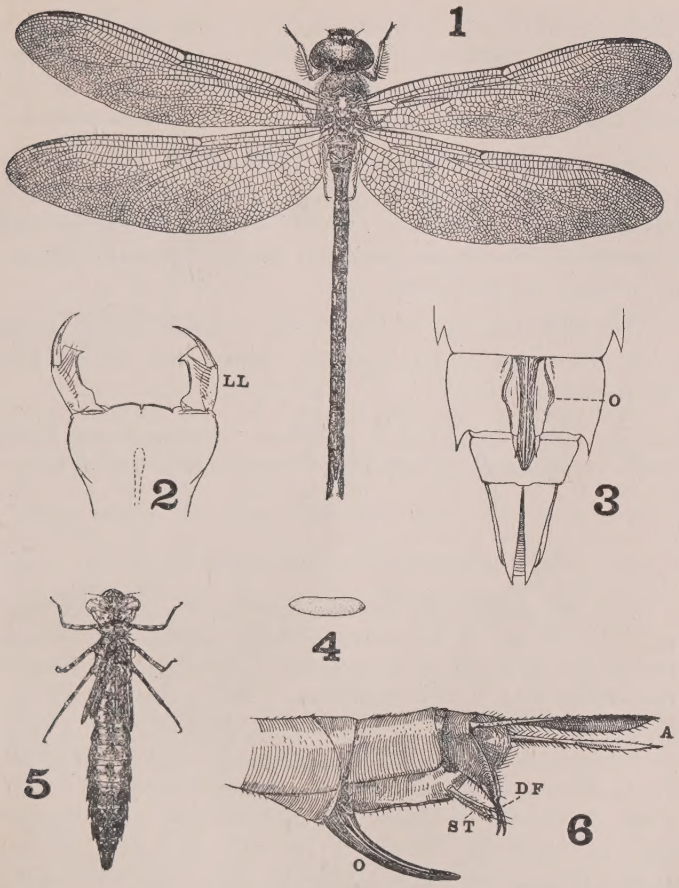
awkward soft creature with stubby wrinkled wings, it developed quickly into the slender graceful insect of the fields. As the wings finally hang down together their full length they are of a dead whitish color; later in the morning they glisten with the beautiful transparency characteristic of such newborn insects. The abdomen lengthens and becomes slenderer, the skin toughens and the dragonfly, still frail and weakly colored, but already fairly proficient on the wing, seeks the early light at the window.

"The genus *Gynacantha* . . . is in some respects the most specialized of all the Æschnines; it is so far as I know the only Odonate genus that is definitely crepuscular in its habits". (Laidlaw, F.F., Proc. U. S. Natl. Mus., 62, Art. 21, 1923, p. 20.)

Williamson, E. B. (1923, p. 41) graphically describes the flight of *Gynacantha nervosa* in the American tropics He observed how they suddenly filled the air in rapidly coming darkness and as suddenly disappeared twenty or thirty minutes later.

Tillyard, R. J. (London, Jl. Linn. Soc., Zool., 33, 1916, on page 72) writing on *Gynacantha mocsaryi* Förster says: "This species is rarer than the preceding, but occurs not uncommonly in North Queensland, where I have taken it in the dense scrub, in railway tunnels, and also at light. Two specimens were taken by me in the long tunnel No. 15 on the Cairns-Kuranda railway. They were flying slowly up and down, at about noon, and their brilliant green eyes appeared most remarkable in the gloom."

Lieftinck, M. A., in his "Annotated list of Javan Odonata" (Treubia, XIV, p. 446) has some interesting notes on *Gynacantha subinterrupta* (Ramb.), in part as follows: "The first individuals appear on the wing about half an hour before dusk falls; leave their resting places and commence a rapid skipping flight in the open. About thirty minutes before sundown, at 6:15 p. m. in the wet season, it may commonly be seen hunting for mosquitoes in the darkened verandas of bungalows, in forest-clearings, over roadside brooks, etc. As twilight comes the insects quickly augment to form small flocks and continue their flight in dark situations, e.g. muddy ditches and among pools under the banks of some small stream, where both sexes skim the surface of the ground, stuffing themselves with immense numbers of mosquitoes. In such places, as night has set in for good, they may only be captured by watching for their silhouette."



GYNACANTHA NERVOSA RAMBUR

"The oviposition was observed by me in wet earth under the over-hanging bank of a shallow pool near Tjisolok (Wijnkoops Bay) in the Karimoen Djaua Islands, where this species is very abundant. I have watched several females ovipositing in the wet soil of a mangrove pool, just before sunset. Few females are taken with the tiny anal appendages whole, these usually having been fractured off during the process of egg-laying, or are gnawed to pieces by the male during copulation. In a forest marsh near the Wijnkoops Bay, I caught two females in the act

of transformation at 10 a. m., the exuviæ hanging on semi-aquatic plants, a few inches above water level. Sometimes, however, the larvæ form burrows or canals in the mud of a ditch or dry-pool, and on emergence ascend a convenient reed stem or stick."

Gynacantha is predominantly a holotropical genus, only a few species extending into temperate regions. In the Pacific it extends well into Polynesia, Fraser describing *G. apiensis* and *G. stevensoni* from Samoa (Insects of Samoa, Part VII, Odonata, pp. 19-44, 5 text figs, 1927).

Gynacantha nervosa is one of our common species being widely distributed in the American tropics and ranging into Florida and California.

I am indebted to Dr. J. G. Needham for determining *Gynacantha nervosa* and for indicating literature referring to it.

Note on Idiocerus provancheri Van D.

In the General Bulletin No. 346, 1920 (p. 19), of the Pennsylvania Department of Agriculture Messers Sanders and DeLong have placed my *Idiocerus provancheri* as a synonym of *Zinneca flavidorsum* A. & S. In 1888 when I began studying the Bythoscopidæ of the eastern United States I made this same erroneous determination and until 1890 this insect stood in my collection as *Zinneca flavidorsum* A. & S. However a careful restudy of the description by Amyot and Serville soon convinced me that their insect had nothing to do with out eastern species. *Zinneca flavidorsum* was described as from "Amerique septentrionale," not from Pennsylvania, and probably was from the West Indies, Mexico or from farther south. The reference to "Pa." in my Catalogue was, I think, taken from Rathvon's list in Mombert's History of Lancaster County, Pennsylvania, published in 1869. Unfortunately I did not have access to this work when I was preparing my Catalogue so that reference was omitted. The head narrower than the pronotum and the entirely coriaceous elytra are sufficient to throw our insect out of *Zinneca* at once. Also the colors given for *flavidorsum* do not apply at all to *provancheri*. Dr. DeLong may have already made this correction but if so I have failed to record it.—E. P. Van Duzee.

A STUDY OF THE NORTH AMERICAN *ODYNERUS HIDALGO* DE SAUSSURE (=*DUCTUS* CRESSON)

(Hymenoptera, Vespidæ)

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Odynerus hidalgo de Saussure, first described from "the warmer parts of Mexico," occurs throughout the United States in three color forms. All these agree in the following structural characters:

Clypeus slightly wider than long, ending in both sexes in a wide, squarely truncate apical margin with rounded edges; its surface coarsely striato-punctate. Posterior ocelli separated by a broad furrow. Antenna of male with a long, finger-shaped, slightly curved terminal hook-like segment, very bluntly rounded at apex. Thorax stubby, but longer than wide; propodeum with broad and long sides, the dorsal lateral areas well set off; concavity deep, shiny, with fine, oblique striæ which are more or less effaced in the upper half, the upper sides being often practically smooth; superior, inferior and lateral ridges well-marked; only the superior ridge with a somewhat wavy carina, ending above in a strong angle, which is separated from the sides of the postscutellum by a deep notch; inferior ridge not crenulate; lateral angles almost square, but rounded off. Postscutellum with a slight, crenulate, transverse ridge, not depressed in the middle. Head and thorax coarsely punctate. Abdomen stubby; first tergite abrupt basally and produced anteriorly in the middle, so that the horizontal posterior, and the vertical anterior faces, meet at a right angle with broadly rounded edge; second and third tergites with a broad, thin and translucent, apical lamella, which is distinctly raised and slightly wider on the sides than in the middle; second sternite with a deep, longitudinal, median furrow at base; first tergite mostly impunctate, but with a group of rather large punctures at extreme sides and sometimes a few in the center; second tergite with fine to moderately large, scattered punctures over basal three-quarters, the apical portion with much coarser and denser puncturation; third and fourth tergites mostly covered with very deep and large punctures; fifth and sixth tergites more superficially punctate; ventrally the punctures are fine and sparse, rather uniformly scattered over the second sternite, more restricted to the apical half on the succeeding sternites. Terminal segments of maxillary palpi gradually decreasing in length. Length (head + thorax + tergites 1 + 2); ♀ 11 to 12 mm.; ♂, 7 to 9 mm.

The combination of nearly impunctate first tergite and second and third tergites ending in a translucent lamella, separates *O. hidalgo* from all other North American *Odynerus*. The three color forms may be separated as follows:

1. Body black, extensively marked with ferruginous-red or rufous in addition to the yellow spots and bands; second abdominal tergite mostly rufous, with a broad yellow apical band and usually without, more rarely with, lateral yellow spots. Wings moderately infuscated.....typical *O. hidalgo*.
... Body black, with yellow markings, without or with few rufous spots; second abdominal tergite predominantly black and yellow, without or with mere traces of rufous.....2.
2. Yellow markings of moderate extent, almost reduced to narrow apical bands on the abdomen; second tergite without lateral spots and with the apical band not appreciably widened on the sides. Wings dark fusco-violaceous.....
.....var. *boreo-orientalis*.
... Yellow markings very extensive; the apical bands of the abdomen broad, that of the second tergite connected or fused with large lateral spots. Wings moderately infuscate, somewhat yellowish .....var. *boreo-occidentalis*.

ODYNERUS HIDALGO, typical form

Odynerus hidalgo H. de Saussure, 1857, Rev. Mag. Zool., (2) IX, p. 275 (no sex; "les parties chaudes du Mexique").

Odynerus (*Odynerus*) *hidalgo* H. de Saussure, 1875, Smiths Misc. Coll., No. 254, p. 252 (♀ ♂; in part: "Varietas Mexicana . . . I caught 2♀, 1♂, var., in the hot part of the province of Mexico, near Cuautta and Cuernavaca. Tamaulipas 1 ♀ . . . Louisiana").

Odynerus ductus Cresson, 1875, Trans. Am. Ent. Soc., IV, p. 238 (♀ ♂; Texas; collected by Belfrage and therefore probably from Bosque Co.).

Specimens examined. MISSISSIPPI: Oxford, La Fayette Co. (F. M. Hull). LOUSIANA: Darrow, Ascencion Co. (J. Bequaert); Mound, Madison Co. (C. R. Jones). MISSOURI: Springfield, Green Co., (H. H Knight). IOWA: Ledges State Park, Boone Co. (H. A. Scullen). KANSAS: Wellington, Sumner Co. (T. H. Parks); Clark Co. (F. H. Snow); Baldwin, Douglas Co. (J. C. Bridwell); Clay Co. (J. C. Bridwell). OKLAHOMA: Ardmore, Carter Co. (C. R. Jones); Okmulgee, Okmulgee Co., at flowers of *Coreopsis* (J. D. Mitchell). TEXAS: Austin (C. T. Brues); Fedor, Lee Co. (Birkmann); Columbus, Colorado Co.; New Braunfels, at flowers of *Ratibida columnaris* (J. Bequaert); Galveston (F. H. Snow); Helotes, Bexar Co. (J. C. Bradley); Wharton, Wharton Co. (J. Bequaert); Cypress Mill, Blanco Co. (W. H. Ashmead); Dallas

(R. M. Gaines); Brownsville (T. C. Barber); College Station, Brazos Co., at flowers of *Callirrhoé involucrata* (H. J. Reinhard); Seguin, Guadalupe Co. (S. K. Jones); Taylor, Williamson Co. (J. C. Gaines); Hill Co.; Terrell Co.; Dilley, Frio Co. NEW MEXICO: Las Cruces (T. D. A. Cockerell); 35 miles East of Santa Fé, 6900 ft. (H. A. Scullen). COLORADO: Ft. Reynolds (Miller); Berkeley, Arapahoe Co. (U. S. N. M.). ARIZONA: Tucson (W. H. Mann); Wheatfields near Globe (D. K. Duncan); Prescott (R. C. Kunze); Catalina Springs (H. G. Hubbard and E. A. Schwarz); Huachuca Mts., Cochise Co. CALIFORNIA: Diablo Mts., Alcalde, Fresno Co. (J. C. Bradley). MEXICO: Meadow Valley, Chihuahua (C. T. Townsend); Tlahualilo, Durango (A. W. Morrill); Vicinity of Mexico City (C. W. Barrett); Victoria, Durango (T. C. Barber and T. E. Holloway).

I have seen upward of 100 specimens. The extent of ferruginous varies considerably but I have seen no true intergrades with the other two forms, although some may be expected in northwestern Florida and Alabama, or Southern California, Nevada and Utah. I have seen only five specimens (all males) which have some yellow on the sides of the second tergite, usually connected with the apical yellow band. These came from Texas, Arizona (Catalina Springs), California (Alcalde) and Mexico City.

I have seen the types of Cresson's *ductus* at the Academy of Natural Sciences, Philadelphia. Also similar specimens, collected by Belfrage in Texas, at the Museum of Comparative Zoölogy and the United States National Museum. All these are of the form of *O. hidalgo* extensively marked with rufous or ferruginous, especially on the second tergite. This was the form first described by de Saussure in 1857, which should be regarded as typical for the species. Cresson did not compare his species with *hidalgo*.

A female from Dallas was found stylopized by *Pseudoxenos hookeri* Pierce (Bequaert and Salt, 1921, Psyche, XXXVI, p. 256).

O. hidalgo boreo-orientalis Bequaert, n. var.

Odynerus (*Odynerus*) *hidalgi* H. de Saussure, 1875, Smiths. Misc. Coll., No. 254, p. 252 (♀ ♂; in part: Northern Variety, from "New York").

Female. Black with the following markings yellow: a spot on each side of the clypeus; a transverse spot between the antennæ; the ocular sinuses; an elongate spot in upper part of outer orbits;

most of outer surface of mandibles; scape beneath; broad humeral margin of pronotum; tegulæ (except for a median ferruginous spot); a transverse band on postscutellum; a small spot in upper plate of mesepisternum, beneath base of wing; outer side of tibiæ; a broad apical band on first tergite, much widened laterally; narrow apical bands on second and third tergites and sternites. Apical portion of femora, under side of tibiæ and entire tarsi ferruginous. In some specimens some of the yellow markings may be more or less suffused or bordered with ferruginous, particularly on the pronotum and first tergite; the propodeum also is sometimes more or less ferruginous. Wings infuscated, with a purplish effulgence, clearer toward the base.

Male. Clypeus entirely yellow. Dorsal areas of propodeum partly yellow. Otherwise as in the female.

Holotype, female, Orient, Long Island, New York (J. Bequaert). *Allotype*, male Cambridge, Massachusetts, at flowers of *Polygonum hydropiper*, July 10, 1932 (J. Bequaert). Both at Museum of Comparative Zoölogy, Cambridge.

Paratypes. MASSACHUSETTS: Nonsuch Pond, Natick (A. P. Morse); Forest Hills, Boston (O. E. Plath). CONNECTICUT: Colebrook (W. M. Wheeler). NEW YORK: Prospect Park, Brooklyn (G. P. Engelhardt); Cold Spring Harbor (J. Bequaert; R. Dow); Ithaca (Chittenden). OHIO: Laura Co. (C. H. Kennedy). NEW JERSEY: Ocean Grove (W. H. Ashmead); Camden Co. PENNSYLVANIA: Pocono Lake (C. T. Greene); Braddock (H. A. Scullen); Philadelphia (U. S. N. M.); Harrisburg (P. R. Myers). VIRGINIA: Falls Church (N. Banks); Great Falls (N. Banks); Glencarlyn (R. A. Cushman); Arlington (Chittenden). WEST VIRGINIA: French Creek (F. E. Brooks). NORTH CAROLINA: North Fork Swannanoa River, Black Mountains (N. Banks). SOUTH CAROLINA: Greenville Co. (H. K. Townes, Jr.); Horry Co. (H. Townes). GEORGIA: Savannah (U. S. N. M.); St. Simons Island (J. C. Bradley); Billy's Island, Okefenokee Swamp (J. C. Bradley). FLORIDA: Greenville, Madison Co. (G. Fairchild); Gulfport, Pinellas Co. (Reynolds); Arcadia, De Soto Co. (U. S. N. M.); Orlando, Orange Co. (O. C. McBride). At the U. S. N. M. there is also a specimen of this variety labelled "Mound, La.", but I regard this label as due to some error.

This variety from the eastern United States, of which I have seen some forty specimens, is remarkably constant in color pattern. The most aberrant specimen seen is a male from Arcadia, Florida, which has the propodeum almost entirely ferruginous-red; yet the second tergite shows no ferruginous at all.

This is the form of the species recorded as *O. hidalgo* in J. B. Smith's "Insects of New Jersey" (1910) (record from Camden, New Jersey), and in M. D. Leonard's "List of the Insects of New York" (1928).

O. hidalgo boreo-occidentalis Bequaert, n. var.

Female. Black with the following markings yellow: clypeus; a large, wedge-shaped mark on the frons between the antennæ; outer surface of mandibles; ocular sinuses; most of outer orbits; scape beneath; most of dorsal face of pronotum; tegulæ (except for a median ferruginous spot); most of scutellum (narrowly divided by a median black line); most of postscutellum; sides of propodeum; most of upper plate of mesepisternum; most of legs; very broad apical bands on all tergites and sternites, those of the first and second tergites slightly or considerably widened on the sides to connect with lateral spots (the black often forming a lozange-shaped mark on the first, and an hourglass-shaped mark on the second tergite; the second sternite is sometimes almost entirely yellow). Some of the yellow markings are edged with ferruginous, especially on the pronotum; scape above and knees ferruginous. Wings slightly infuscated, with a yellowish tinge; the radial cell darker and somewhat purplish.

Male. Scutellum black; yellow band on postscutellum narrow; yellow spots on propodeum and mesepisternum small; otherwise like the female.

Holotype, female, Riverside, Riverside Co., CALIFORNIA, March 23, 1928, bred from pupa (C. H. Hicks). *Allotype*, male, Warren, Idaho Co., IDAHO. Both at the Museum of Comparative Zoölogy, Cambridge.

Paratypes. CALIFORNIA: Sisson near Mt. Shasta, Siskiyou Co. (Wickham); Dunsmuir, Siskiyou Co. (Wickham); Los Angeles Co. (D. W. Coquillett); mountains near Claremont, Los Angeles Co. (C. F. Baker); Three Rivers, Tulare Co., 600 to 800 ft. (J. C. Bradley); Midfork Kaweah River, Sequoia National Park, Tulare Co., 1700 ft. (J. C. Bradley); Warrens, San Diego Co. (J. C. Bradley). WASHINGTON STATE: Wawawai, Whitman Co. (W. M. Mann); Squaw Creek, Yakima, Yakima Co. (S. Henshaw); L. McElroy, Paha, Adams Co. (M. C. Lane).

I have seen fifteen specimens. The extent of yellow varies, especially on first and second tergites. Specimens from Washington State have the yellow markings more reduced than most of those of California, while the ferruginous color is more extended, notably on the pronotum. They may possibly repre-

sent a fourth color form; but my material from the Pacific Coast is far too limited to decide the matter.

The var. *boreo-occidentalis* is homeochromic with several other wasps of the Pacific Coast, notably *Ancistrocerus halophila* Viereck and *Odynerus sulfureus* de Saussure.

Biological Control

The Biological Control of Insects. By Harvey L. Sweetman, with a Foreword by L. O. Howard, pp. xxii+461, 6 portraits and 143 figures. 1936. Comstock Publishing Co., Inc. Ithaca, N. Y. $3.75

Well turned out in the usual excellent style of the Comstock Publishing Company we are here presented with the first general treatise on this highly important and timely subject. It is apparent that Prof. Sweetman has an unusually fine grasp of the subject as a whole. Some idea of the scope of the work may be had from a brief review of the chapter headings. Chap. 1, Theoretical Basis of Biological Control; 2, Use of Resistant Hosts; 3, Use of Microorganisms, Bacteria and Fungi; 4, Viruses and Protozoa; 5, Use of Parasitic Invertebrate Animals, Nemathelminthes; 6, Hexapoda, Diptert; 7, Hymenoptera; 8, Arachnida and Hexapoda; 9, Some Biological Relations of Insect Parasites and Predators; 10, Factors to Be Considered in the Utilization of Insect Parasites and Predators; 11, Introduction of Insect Parasites and Predators; 12, Use of Predatory Vertebrate Animals; 13, Results of Biological Control Experiments Against Animals; 14, Biological Control of Pest Plants.

The Anthocoridæ are mentioned as predominantly plant feeders whereas all of the species whose habits are known to the reviewer, either in the field or through literature, are predaceous.

Among the most desirable features of the book are the glossary of over five pages in which terms are meticulously defined, and the extensive bibliography arranged at the end of the book by chapters. Entomologists are deeply indebted to Professor Sweetman for bringing together as an easily accessible and fundamental work the foundations of this young branch of our science. It justly deserves a place in the library of everyone who would keep abreast of the kaleidoscopic developments in the swiftly advancing science of entomology.—R. L. Usinger.

A COLLECTION OF TERMITES FROM CEYLON AND JAVA

BY S. F. LIGHT

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The termites discussed in this note were collected in Java and Ceylon by Miss Jane Collier for Professor L. R. Cleveland of Harvard University. Their intestinal Protozoa are being studied by Professor Cleveland and Professor Harold Kirby of the University of California. Dr. Cleveland kindly sent me the termites for study.

Our knowledge of the taxonomy of the termites of most regions is still very preliminary in nature. Many new species remain to be discovered and described, and for known species either the alate or the soldier is often unknown. More distressing, however, is the paucity of our knowledge of the range of intraspecific variation and therefore, of the validity of the characters used to distinguish species. Without such knowledge it remains impossible, of course, to effect satisfactory revisions of the described species, many of which I believe should be in synonymy. Each new collection adds to our knowledge of geographical and ecologic distribution and should also add definiteness to knowledge of this variational range. It has seemed worth while, therefore, to present such information as has been obtained from a study of this collection although it contains no species new to science.

The species appearing in the collection are given below in separate lists for Ceylon and Java. After each is given the locality and such notes as are available as to habitat. Those species presenting points of special interest are separately discussed.

Ceylon

1. *Neotermes greeni* (Desneux). In wood of *Pittosporum vividiflorum* Sims, Peradeniya.
2. *Neotermes militaris* (Desneux). In wood of tea, *Thea sinensis*, Masheliga.
3. *Glyptotermes dilatatus* Bugnion and Popoff. In tea bushes, Peradeniya.
4. *Cryptotermes* (*Planocryptotermes*) *nocens* Light. From building timber, Paradeniya.
5. *Coptotermes ceylonicus* Holmgren. Homagama.
6. *Odontotermes* (*Hypotermes*) *obscuriceps* (Wasmann). Peradeniya.

7. *Odontotermes* (*Odontotermes*) *ceylonicus* (Wasmann). Peradeniya.
8. *Odontotermes* (*Odontotermes*) *horni* (Wasmann). Peradeniya.
9. *Hospitalitermes monoceros* (Koenig). Peradeniya.

JAVA

1. *Neotermes dalbergiæ* Kalshoven.
2. *Neotermes tectonæ* (Dammerman). In living teak wood, Djember, Eastern Java.
3. *Glyptotermes montanus* Kemner. From piece of wood lying in a swamp, Telaga Warna.
4. *Cryptotermes* (*Cr.*) *cynocephalus* Light. In piece of very dry wood from a native house.
5. *Cryptotermes* (*Planocryptotermes*) *nocens* Light. In piece of very dry wood from buildings, Kedorngdjati.
6. *Coptotermes curvignathus* Holmgren. From Kapok log, Bandjar.
7. *Coptotermes travians* (Haviland). From large piece of wood from teak forest, Kedorngdjati.
8. *Macrotermes gilvus* (Hagen). In decayed wood, Depok.
9. *Odontotermes* (*Odontotermes*) *grandiceps* (Holmgren). Two collections both from Tjibodes; one from a fungus growing between the stones of a walk, and one from decayed wood.
10. *Nasutitermes* (*Nasutitermes*) *pusillus* (Holmgren). Two collections both from decayed wood at Depok.

GLYPTOTERMES DILATATUS Bugnion and Popoff 1910

The excellent collection including numerous alates, and soldiers allows for presentation of certain points not brought out in previous descriptions.

Alate: Kemner (1926) gives the number of segments in the antennæ as fourteen while the six alates before me with perfect antennæ each have fifteen segments. The eye is elongated in an obliquely anteroposterior direction and is separated from the lower margin of the head capsule by about two thirds its shorter diameter. The radius is even shorter than stated by Kemner, being confined to the basal one-fifth of the fore wing. The median, which is separate throughout the membrane of the fore wing, arises from the radius sector in the basal one-eighth of the hind wing. Weak venation of an irregular type often simulates a longitudinal vein near the cubitus with numerous anterior branches to the median.

Measurements in millimeters of alate of *Glyptotermes dilalatus* Bugnion and Popoff: Width of head and eyes 1.32; width of pronotum 1.32; length of pronotum 0.68; maximum diameter of eye 0.30; least diameter of eye 0.24; long diameter of ocellus 0.15;

short diameter of ocellus 0.10; distance from eye to ocellus 0.03; distance of eye from lower margin of head 0.18; length of forewing 9.00; length of forewing without scale 8.00.

Soldier: The posterior and dorsal margins of the antennal foveolæ project, being visible beyond the lateral margins of the head capsule when seen in ventral view, while in *G. montanus* Kemner (see below) they hardly project at all and are not at all visible from below. The gulamentum is strongly narrowed near its middle and bears a smoothly concave notch at the point of articulation of the maxillæ. This is in contrast to the gulamentum of *G. montaus* which shows no such notch, its sides gradually approaching in their posterior two-thirds.

The demarcation between the dorsal surface of the head and the frons is very sharp, the frons appearing concave due to the anterior projection of the angular tubercles marking the latero-dorsal rims of the frons.

Measurements in millimeters of a soldier of *Glyptotermes dilatatus* Bugnion and Popoff: Length of head capsule 1.98; width of head capsule 1.35; length of left mandible 1.14; width of pronotum (in place) 1.38; length of pronotum 0.71; maximum width of gulamentum 0.48; minimum width of gulamentum 0.22.

CRYPTOTERMES (PLANOCRYPTOTERMES) DUDLEYI Banks

Planocryptotermes nocens Light[1], 1921
Cryptotermes (*Planocryptotermes*) *nocens* Light, 1930.
Cryptotermes (*Planocryptotermes*) *primus* Kemner, 1932
nec *Cryptotermes primus* Hill, 1926.
Cryptotermes (*P.*) *javanicus* Kemner, 1933
Calotermes (*Cryptotermes*) *jacobsoni* Holmgren, 1913
Cryptotermes (*Planocryptotermes*) *jacobsoni* Kemner, 1933.

A careful comparison of the soldiers of a colony from Ceylon, evidently Kemner's *Cryptotermes* (*Planocryptotermes*) *primus* (1932), and a single soldier from Java, evidently Kemner's *Cr.* (*P.*) *javanicus* (1933), with numerous soldiers of *Cr.* (*P.*) *nocens* Light (1921) from Manila shows very close agreement and fails to show any consistent differences. I am constrained therefore to maintain the existence of a single species ranging from the Philippines to Ceylon. Nor is this to be considered unusual or unexpected. As I point out below, a similar situation seems to exist in the case of the small *Cryptotermes* species, *Cr. cynocephalus* (=? *Cr. domesticus* Haviland). *Macrotermes gilvus* is another Oriental species known to have wide range.

[1] Prof. Alfred Emerson of Chicago informs me (in litt.) that careful comparison shows *Cryptotermes dudleyi* Banks of Panama to be identical with *Planocryptotermes nocens* Light. *Cr. dudleyi* being older, *P. nocens* Light falls into synonymy with it.

No doubt increasing knowledge will bring to light extended ranges for other species of Termites in the Orient bringing into synonymy more and more of the local names. This has been found to be true in the case of certain species of North America, Central America and the Pacific Islands. For example, in a previous report (1932) I have shown that *Kalotermes immigrans* Snyder originally known only from Hawaii ranges from Hawaii through Fanning Island to the Marquesas; and in a later paper I have shown it to be common in the Galapagos Islands and in the coastal region of Ecuador. As an example of a continental species with a great range I may cite *Kalotermes* (*Paraneotermes*) *simplicicornis* Banks (1920) which ranges from southeastern Texas to southern California and from southern Nevada at least as far south as San Blas de Sinaloa in Mexico (Light, in Kofoid, Light et al 1934).

I append measurements of the head of the soldier of *Cryptotermes* (*P.*) *nocens* from Java, of three soldiers from Ceylon and of a single soldier from Manila chosen at random, to show (1) the range of variation within so small a sample of soldiers (four) from the single colony from Java and (2) the fact that the individuals from Ceylon and Manila fall within the range of variation set by these three soldiers from a single colony. Clearly, as was indicated by my footnote (1921) to the diagnosis of *Planocryptotermes*, we must choose between considering this a single variable species or erecting a large series of closely related species, only, as I believe, to have them fall into synonymy with increasing knowledge.

Meaurements, in millimeters, of soldiers of *Cryptotermes* (*Planocryptotermes*) *nocens* Light: (1) from Ceylon; (2), (3), and (4) from Java; and (5) from Manila.

	(1)	(2)	(3)	(4)	(5)
Length of head	1.77	1.80	1.71	1.68	1.80
Width of head	1.35	1.38	1.32	1.26	1.38
Head index	0.76	0.77	0.77	0.75	0.77

COPTOTERMES CEYLONICUS Holmgren, 1911

The collection contains many soldiers and workers. These soldiers are light in color for the genus, the head being whitish-yellow, the mandible yellowish-red at base and light red distally.

The range of size among these soldiers is so great as to suggest at first the probability that two species or at least two colonies of different ages were represented. Certain individuals, however, show intergradation. Measurements of two individuals are given to give the range of their size variation.

Length of head with mandible		2.40
Length of head	1.26	1.50
Width of head	1.05	1.20
Length of left mandible	0.75	0.93
Width of pronotum	0.72	0.90
Maximum width of gula	0.41	0.55
Minimum width of gula	0.17	0.23

It will be seen that these larger soldiers considerably exceed in certain dimensions the maxima given by Holmgren (1913).

ODONTOTERMES (HYPOTERMES) OBSCURICEPS (Wasmann)

The single collection contains three soldiers which agree closely in measurements. As the measurements given below will show they agree fairly well with *O.* (*H.*) *obscuriceps* Wasmann as described by Holmgren (1913).

Measurements of soldiers of *Odonotermes Hypotermes obscuriceps* (Wasmann) from Peradeniya: Length of head with mandibles 1.74; length of head 1.20; length of left mandible 1.23; width of head 1.02; width of pronotum 0.75.

The anterior margin of the pronotum shows a distinct median notch as noted by Wasmann (1896) but not by Holmgren and as found by Kemner in *O.* (*H.*) *marshalli.* The antennæ show 16 segments of which the second and third are very small and subequal which emphasizes again the danger of using this growing zone of the antennæ as of diagnostic value.

It will be noted that these soldiers are larger in several dimensions than shown by Holmgren's measurements. It seems probable that more extensive series will show the two species *O. obscuriceps* and *O. marshalli* Kemner to represent extremes of a single variable species.

The workers present, all of the same size, are evidently the larger workers since the head is about 1.20 millimeters in width.

ODONTOTERMES (ODONTOTERMES) CEYLONICUS (Wasmann).

The soldiers of this collection agree well with those described by Holmgren (1913). Measurements are as follows in millimeters: Length of head with mandibles 2.88; length of head, 1.80; width of head 1.32; width of pronotum 0.96; width of gula 0.48.

The antennæ are of 15 or 16 segments. When 15 the third is shortest.

Large and small workers have a head width respectively of about 1.35 and 0.90 millimeters.

ODONTOTERMES (ODONTOTERMES) HORNI (Wasmann)

The numerous soldiers in this single collection show a wide range not only of head dimensions but of proportions as brought out by the measurements below of extreme individual.

Length of head	2.28	2.70
Width of head	1.86	2.04
Head index	0.82	0.76

It will be noted that these measurements approximate most closely those of *O. horni* var. *minor* Kemner (1933) but overlap them. Here again I feel certain that complete series will show this variation to be intercolonial and not characteristic of races or varieties.

GLYPTOTERMES MONTANUS Kemner 1933

This large and distinct species is represented by numerous soldiers in the collection at hand. I had described it as a new species prior to receipt of Kemner's paper (1933). The description of the soldier is included as being more complete than that of Kemner and giving information as to range of variation.

Soldier. Body pale yellowish; pronotum light yellow brown; head pale yellow brown behind to red brown in front, somewhat infuscate from middle on; Y- suture distinct, white; frons and bases of mandibles smoky red; mandibles reddish black distally; antennæ and palpi yellow-brown.

Head parellel-sided or with sides converging slightly anteriorly; antero-lateral corners sharp, somewhat projecting; postero-lateral corners rounded; posterior margin straight; head high but not so high as broad, head-height index about 0.9. Frons sloping at an

angle of about 45°, upper margin two-lobed due to central groove running back to point of bifurcation of Y-suture; these two lobes, located on a line posterior to the dark mandibular articulations and dorsal to and slightly anterior to the prominent white, vertically crescentic eyes, are set off as low anteriorly projecting cones by a flat groove which runs across the anterior area of the frons. Eye narrow, dorso-ventrally elongated, separated from posterior rim of antennal foveola by slightly more than its own short diameter; rim of foveola only very slightly produced. Labrum scarcely longer than wide, widest behind middle, anterior end rounded.

Gulamentum narrow, narrowest behind middle, gular width index 0.75 (0.45 for *G. dilatatus* !).

Antennæ of twelve segments, third shortest with indications of a basal division to make thirteen segments, the new third being very short.

Pronotum somewhat concave in front, antero-lateral corners shortly rounded, projecting somewhat anteriorly, sides weakly convex in front, receding strongly from in front of middle and curving broadly into the narrow, straight or weakly convex, posterior border which shows only the faintest trace of a median notch. Femora relatively weak; all tibiæ with three spines. Tenth tergite elongated, paler than other terga, with a somewhat swollen appearance.

Measurements in millimeters and indices of a soldier of *Glyptotermes montanus* Kemner: Length of entire animal 8.00; length of head with mandibles crossed 3.70; length of head capsule 2.61; height of head 1.50; width of head 1.64; length of left mandible 1.20; length of pronotum 0.65; width of pronotum 1.56; length of labrum, dissected 0.50; width of labrum 0.49; length of gulamentum 1.74; maximum width of gulamentum 0.42; minimum width of gulamentum 0.27; head index 0.63; head height index 0.91; pronotal index 0.50.

Systematic position: *G. montanus* is the largest Oriental species of the subgenus save *G. satsumensis*. From all other species which approach it in size and indeed from all Oriental species it differs in that the left mandble has three subequal, approximately equally spaced triangular teeth.

Cryptotermes cynocephalus Light

? *Cryptotermes buitenzorgi* Kemner 1933.

A collection containing numerous soldiers and alates agrees completely as regards all castes with *Cr. cynocephalus* Light of the Philippines, and so far as I am able to determine from the figures and descriptions with *Cr. buitenzorgi* Kemner (1933)

which would therefore become a synonym of *Cr. cynocephalus*. It should be pointed out that collections of *Cr. cynocephalus* obtained subsequently to the published description (1921) show the head to be as wide as 1.00 mm. in some soldiers.

In the absence of authoritatively diagnosed comparative material of *Cryptotermes domesticus* (Haviland) it seems unwise as yet to reduce both *Cr. cynocephalus* and *Cr. buitenzorgi* species to synonymy with *Cr. domesticus* which I believe will be the fate of these species and perhaps of *Cr. perforatus* Kemner (1932).

COPTOTERMES TRAVIANS (Haviland)

The single collection with numerous soldiers agrees closely with Kemner's description (1933). It seems probable that *C. vastator* Light common throughout the Philippines, and other medium sized oriental species, will prove to belong to this species.

ODONTOTERMES (ODONTOTERMES) GRANDICEPS (Holmgren) (?)

Two collections each containing a number of soldiers. While these soldiers are considerably larger than any yet described from Java, save *O. bogoriensis* Kemner, and have actually broader heads, relatively much broader, it seems better to place them in this species with which they agree in tooth characters and shape of head and gula.

Unpublished work involving measurements of soldiers from a very large series of Philippine *Odontotermes* has convinced me that an extremely wide range of variation with regard to size, proportions of the head, and position of tooth is characteristic of the species of this genus. Study of large series will ultimately, I believe, reduce very greatly the number of species. Meanwhile the systematist has the unfortunate choice of adding on the one hand to an already swollen list of species or burying the very information necessary to a solution of the situation. The happy medium is often hard to find. In the present instance, I have chosen the latter course since alates are not present and since, the two collections having been allowed to dry out at some time, the characters of the soldier are not all available. Measurements follow to be of aid to the future investigator of this knotty problem.

Length of head with mandibles	3.48	4.20
Length of head	2.70	2.88
Width of head	2.12	2.34
Length of mandible	1.26	1.32
Distance from tooth to tip	.....	0.98
Distance from tooth to base	.....	0.54
Tooth position index	.....	0.70
Head index	.....	0.70

NASUTITERMES (N.) *pusillus* (Holmgren)

Two collections, one with alates, agree with the description of the species which is based on soldiers. Soldier measurements follow as also a description of the heretofore unknown alate.

Measurements in millimeters, and indices, of soldiers of *Nasutitermes pusillus* Holmgren to show the range of variation.

Length of head and rostrum	1.48	1.36	1.28
Length of head without rostrum	.94	.92	.87
Length of rostrum	.54	.44	.41
Head production	.35	.34	.34
Height of head	.58	.58	.53
Width of head	.77	.75	.72
Length of hind tibia	1.13	1.10	1.07
Head index	.....	0.81	.....
Head rostrum index	.....	0.49	.....

Description: *Alate.* Abdominal tergites very dark brown, head and abdominal sternites lighter brown; lateral thoracic sclerites light smoky brown; antennæ light brown; palpi, labrum, postclypeus, legs and nota brownish yellow; pleural membranes white, conspicuous.

Antennal foveolæ in deep grooves on side of head which converge anteriorly. Labrum shorter than broad, broadest at about middle. Postclypeus short, about four times as wide as long, hardly swollen. Fontanel large, white, conspicuous, oval, located behind line joining middle of eyes. Ocelli broad oval, strongly oblique, separated from eye by short diameter or more. Eye large but not strongly projecting, separated from lower margin of head by about one-sixth its diameter, from dorsal margin by about one-third its diameter. Antennæ of 15 segments, somewhat elongated; second segment smallest, third longer than 4th, 5th, or 6th which are subequal.

Anterior margin of pronotum entire, straight or faintly convex; posterior margin weakly emarginate; corners rounded; sides straight, converging. Mesonotum with broadly and evenly con-

cave posterior margin and sharply rounded corners. Posterior margin of metanotum arcuate, corners broadly rounded.

Wings about twice as long as thorax and abdomen; membrane pale gray-brown, veins brown; a dark chocolate line posterior to radius section succeeded by a broad diffuse yellowish zone (costal stripe).

Measurements in millimeters of typical alate of *Nasutitermes pusillus* (Holmgren): Length over all, 15.5; length of fore wing, 13.8; width of fore wing, 3.63; length of head, 1.51; length of head capsule, 0.99; width of head capsule, 1.07; width of head with eyes, 1.42; length of pronotum, 0.77; width of pronotum, 1.22; long diameter of eye, 0.45; short diameter of eye, 0.41; long diameter of ocellus, 0.18; short diameter of ocellus, 0.16; distance of ocellus from eye, 0.12.

Collecting Notes

A female specimen of *Dyslobus squamipunctatus* Pierce now in the collection of the writer was taken by Miss Evelyn Daybell at Eureka, California, in the spring of 1935. This is, so far as is known, the third specimen in collections. The species was described by Pierce in 1909 from two male specimens taken by H. S. Barber at Eureka and was not collected again for twenty-six years. The specimen was determined by Dr. Van Dyke's key to the species of *Dyslobus* (Pan-Pacific Entomologist, 1933) and sent to Mr. L. L. Buchanan who compared it with the type, confirming the identification.

On February 20, 1937, Mr. Mont Cazier and the writer took fifteen larvæ of the beetle *Dascilllus davidsoni* around the roots of snowberry, *Symphoricarpus*, at Stevens Creek, Santa Clara County, California. Hundreds of adults were observed emerging at this spot the year before on May 3. The larvæ of this beetle as well as of most beetles are seldom collected and this note may be of interest to those interested in immature stages of insects. The same day twenty-one specimens of the rather uncommon weevil *Peritelopsis globiventris* were taken at Half Moon Bay, San Mateo County, on the sea side daisy, *Erigeron glaucus*. Mr. Harry Lange recently reported this weevil doing some damage to globe artichoke in San Cruz County (Pan-Pacific Entomologist, 1936).—P. C. Ting.

A FEW NEW HEMIPTERA

BY E. P. VAN DUZEE

The following descriptions represent species in the collection of the California Academy of Sciences that do not seem to have been previously published.

Peribalus hirtus Van Duzee, n. sp.

Size and aspect of *tristis* Van Duzee but clothed with short stiff grey hairs, the connxevum but narrowly edged with pale. Length 9 mm.

Female: Head broad as in *tristis* but somewhat shorter, the cheeks not quite meeting before the tylus; antennæ as in *tristis*, segments IV and V subequal, longer and thicker than II and III; rostrum nearly attaining the hind coxæ. Pronotum rugosely punctate, the sides thickened with the adjoining disk depressed; apex of scutellum scarcely narrower than in *tristis*. Whole upper surface irregularly, coarsely, in places almost rugosely, punctate, the punctures being somewhat closer on the disk of the corium. Beneath closely, deeply punctate, the punctures on the venter smaller and confused.

Color about as in *tristis*, testaceous brown, much obscured by the coarse black punctures giving the whole insect a blackish appearance. Tip of scutellum, lateral margins of pronotum and connexivum narrowly pale; tibiæ and tarsi paler or somewhat piceous in places; antennæ pale or fuscous with pale incisures; rostrum pale, piceous at tip. Whole surface clothed with long pale hairs which become shorter on the disk of the corium and venter, the longer hairs as long as the thickness of the hind tibiæ.

Holotype, female, No. 4207, Mus. Calif. Acad. Sci. Ent., taken at Potwisha, Sequoia National Park, at about 4,000 feet elevation, June 20, 1929; paratypes four females taken at the same place from May 20 to June 2, 1929, all by Dr. E. C. Van Dyke, and one female taken by Mr. F. T. Scott at the same place in March, 1936. The shorter head, rougher punctation, thickened sides of pronotum, shorter rostrum and especially the long stiff pale vestiture will at once distinguish this species. This is one of a number of new or interesting Hemiptera taken by Dr. Van Dyke in the Sequoia National Park.

Arocera elongata Uhler, MS.

Deep black; head before the eyes, segment I of the antennæ, apex of scutellum, base and apex of elytra, and base of the

abdomen red: Latero-posterior margins of the pronotum deeply excavated. Length 18-20 mm.

Head and pronotum impunctate or nearly so; cheeks obscurely striate; latero-posterior margin of pronotum deeply sinuate. Segment II of antennæ about one-half as long as III; scutellum with sparse fine, nearly obsolete, punctures. Elytra wrinkled and obscurely, minutely punctate, more distinctly so at apex. Rostrum attaining middle of fourth ventral segment.

Color deep black; head, except base of vertex, apex of scutellum, a spot at base and at apex of the elytra, the former including the base of the clavus, basal segment of the rostrum and the venter red. Outer angle of fifth ventral segment, all of the sixth and usually the basal and lateral plates of the female terminalia black. Ventrals II, III, and IV with a black marginal spot, V sometimes with a round median spot and there may be a red marginal spot on the meso- and metapleuræ; antennal I and base of II red.

Merida, Venezuela, one female from the author's collection in the museum of the California Academy of Sciences. This specimen was in a collection purchased by the author from a dealer in Germany about 30 years ago. The Carnegie Museum has one from Chapada, Brazil, and two from Province del Sara, Bolivia. This is apparently the species figured in the July, 1929 number of the National Geographic Magazine, plate V fig. 1, where it is given the name used above, evidently a MS name never published by Dr. Uhler.

An interesting question comes in here. Does the publication of this figure in the National Geographic Magazine establish the species, and if so what is the type of the species and who is its author? Uhler cannot be the authority for the name as he neither described nor figured it. Mr. Franklin L. Fisher apparently selected the specimens for illustration in this article and Mr. E. L. Wisherd photographed them. I cannot learn that either of these men was interested in entomology, at least from a systematic standpoint. As we cannot give Dr. Uhler as authority for the species should we credit it to Mr. Fisher and Mr. Wisherd, or to Mr. Grosvenor as editor of the National Geographic Magazine, who appropriated the funds for the preparation and illustration of the paper, or should the present brief description be used as authority of the species. I know of no other case exactly parallel to this and am sure we would

who has given this matter serious consideration. There might seem to be here an argument in favor of the omission of the name of the authority for systematic names, but frequently the name of the author of a species, especially if followed by the date, will enable the student to turn at once to the description without having to refer to a catalogue.

Catacanthus eximius Van Duzee, n. sp.

Allied to *carrenoi* but easily distinguished by having the pronotum entirely of a deep greenish blue except for a small red spot behind the humeri, and different male genital characters. Length 25 mm.

Striæ of cheeks more feeble than in *carrenoi* and the elytra more closely punctate; antennals II and III equal in the male, III longer in the female; apex of scutellum acute as in *carrenoi*. Apical margin of male pygofer subacute, not broadly rounded as in *carrenoi*, the setose lateral plate armed within with a nearly horizontal stout black tooth not found in the allied species, the median triangular plate more deeply notched. Female genital pieces much as in *carrenoi* and similarly marked with black.

Head, antennæ, pronotum except the small post humeral spot, scutellum to near the apex of the frenum, a large discal elytral spot somewhat produced anteriorly on the costa and narrowly attaining, or almost attaining, the inner angle, narrow inner edge of the clavus, basal two-thirds of the membrane, legs, four spots either side the venter, most of the rostrum and the narrow inferior edge of the pronotum, blue-black or somewhat tinged with green; lower surface except as noted, connexivum, apex of scutellum, frenum and a small spot behind the humeri, clear sanguineous; elytra whitish testaceous marked with blue-black as noted; apex of membrane slightly enfumed.

Holotype, male No. 4208, and allotype, female, No. 4209, Mus. Calif. Acad. Sci., Ent., taken on Mindanao, Philippine Islands, the male May 5, at 2050 feet, the female taken before July 17th at 1000 ft., and 14 paratypes taken with the types. Two nymphs taken May 5th have the tergum sanguineous with three large median, and a row of marginal spots blue-black. This evidently is the insect designated as variety *b* of *tricolor* (equals *carrenoi*) by Stal but it is a good species.

Chariesterus brevipennis Van Duzee, n. sp.

Castaneous-brown varied with fuscous; antennal III lanceolate; elytra attaining middle of fifth dorsal segment; margin of pronotum coarsely tuberculate. Length 10-11 mm.

Head nearly square; vertex deeply sulcate on median line between anterior angles of the eyes and with a deep preocular pit; antenniferous tubercles produced in an acute black spine; antennal I as long as from anterior angle of eye to base of pronotum, without marginal tubercles; the segmental lengths as 48:35:30:16; III expanded from base, lanceolate, its width about one-fourth its length; IV elongate fusiform, two-thirds as wide as I. Pronotum nearly as long as its humeral width; sides coarsely denticulate, scarcely sinuate, surface granulate posteriorly. Elytra closely punctate, appearing granulate; corium attaining middle of tergal IV, the membrane middle of V. Rostrum scarcely attaining coxæ II, segment I reaching the posterior line of the eyes. Apical spines of the femora minute. Genital segment of male truncate; apical plates of female more obtuse and arcuate exteriorly than in *antennator*.

Color dark castaneous becoming blackish on base of head either side of the median line, on the anterior and lateral margins of the pronotum and slightly so on the area of the callosities, more obscurely on the costa, lateral area of tergum, apical portion of femora, tibiæ, coxæ, trochanters and antennals III and IV; rostrum black; eyes red; membrane deep fuscous; beneath lighter castaneous, the stemmata black.

Holotype, male (No. 4210) and allotype, female (No. 4211) Mus. Calif. Acad. Sci., Ent.) taken on Clarion Island, Mexico, February 27, 1928, by Thomas Craig and presented by him to the Academy.

It may be noted here that in this genus there is a recurrent vein in the wing cell as in genus *Coriomeris*, near which genus it should, perhaps, be placed.

Darmistus crassicornis Van Duzee, n. sp.

A little stouter than *subvittatus*; antennæ thicker and, with the legs, heavily setose; cheeks not distinctly passing the tylus. Length 11 mm.

Head as in *subvittatus* except that the cheeks, viewed from the side, do not obviously surpass the tylus; bucculæ elliptical, not longer than high as in *subvittatus*. Rostrum attaining hind margin of middle coxæ. Antennæ about twice as thick as in the

allied species, the segments as 20:40:34:35; I, II and III rather closely set with stiff hairs mostly as long as the thickness of the segment; IV pale pubescent. Pronotum as long as its basal width; collum broad and flat, scarcely distinguished. Scutellum acutely triangular; apex of corium less acute than in *subvittatus*, the posterior angle of the metapleura more produced. Male genital characters about as in *subvittatus*, the median tooth narrower at base and not surpassed by the smaller stiles as in the allied form.

Color as in the allied species; testaceous yellow, coarsely fuscopunctate and clothed with short stiff pale hairs becoming long pale setæ on the antennæ and legs; two obscure vittæ on vertex, four on pronotum, three on scutellum and disk of the corium more or less infuscated; base of head, side of pronotum, tip of scutellum and costa paler; beneath paler yellow; venter infuscated, irrorate or washed with sanguineous; median line from bucculæ to apex of venter, another on the anterior coxæ and sides of the mesosternum, a cloud along the side of the head and propleuræ, and the median line and apical segment of the rostrum black or blackish; middle of hind coxæ with a blackish cloud; legs fuscopunctate at base of spines; middle of venter sparsely pale setose; membrane brown, the veins margined with pale.

Holotype, male (No. 4212) Calif. Acad. Sci., Ent.,) and four male paratypes taken by Mr. C. D. Duncan on the Chisos Mts., Texas, in July, 1921 and two males taken by Mr. Duncan at Sheffield, Pocos Co., Texas, July 24. The stout antennæ and long-setose legs and antennæ will at once distinguish this species.

Darmistus duncani Van Duzee, n. sp.

A little larger and darker than *subvittatus* with polished piceous antennæ, clothed with longer and sparser setose hairs. Length 11 mm.

Head as in the related species but with the cheeks not exceeding the tylus. Antennæ slender as in *subvittatus*; segments as 20:35:25:40; I. II and III polished, piceous, with scattering setæ which are about as long as the thickness of II and III; IV brown with pale pubescence and a few longer setæ; legs sparsely long-setose. Beneath pale yellowish, venter and disk of the pleuræ smooth with a few blackish punctures; venter obscurely irrorate with sanguineous with a few black points at base and along the sides; median line of the metasternum and apex and median line of rostrum black; membrane uniformly brown; pale median line of pronotum distinct as in *crassicornis*; median tooth of male genital segment broad, elongate triangular, much exceeding the short stiles.

Holotype, male (No. 4213) and allotype, female (No. 4214), Mus. Calif. Acad. Sci., Ent., taken by Mr. D. K. Duncan at base of Penal Mts., Arizona. This species is nearest to *subvittatus* but may be distinguished by the shorter cheeks, piceous-black and somewhat polished antennæ, the poorly developed median black vitta beneath and the distinct male genital characters. *D. subvittatus* is represented in the Academy collection by material from Colorado, Arizona and southern California.

Key to our species of Darmistus

1. Antennæ stout, heavily armed with setæ nearly as long as the thickness of the segment; segment I one-half the length of II, one-third as thick as long ..... *crassicornis*
... Antennæ more slender, less setose, segment I two-thirds the length of II, one-fourth as thick as long 2
2. Antennæ smooth, piceous, more sparingly beset with longer setæ; segment IV dull castaneous, minutely pubescent, cheeks not exceeding the tylus ..... *duncani*
... Antennæ paler, brown-punctate, segment I and apex of II and III infuscated; IV pale castaneous, minutely pale pubescent; cheeks more produced, distinctly exceeding the tylus ..... *subvittatus*

Trapezonotus vandykei Van Duzee, n. sp.

Aspect of *rufipes* Stal but slightly larger with the pronotum more narrowed anteriorly; black, opaque, with the basal segment of antennæ and the legs in part pale. Length 4 mm.

Head as long as wide between the eyes, coarsely, closely punctate, the punctures becoming subobsolete posteriorly where the surface is dull and opaque; tip of tylus pale. Antennæ stout; segment I passing apex of head by one-third its length; II about twice the length of I, III one-half longer than I, IV a fourth longer than II; I and extreme apex of II and III ochraceous; surface minutely pilose with a few longer setæ. Pronotum anteriorly scarcely wider than head, its surface opaque black, coarsely punctate, the punctures subobsolete across disk of anterior lobe; lateral margins slenderly explanate and pale; posterior lobe usually more or less invaded with ochraceous. Scutellum rather obscurely punctate. Elytra coarsely punctate, obscurely so on disk of corium; clavus with three rows of punctures, the inner more irregular; surface brownish ochraceous, sometimes almost entirely black; membrane abbreviated, black, nervures white. Beneath black, polished on the venter; narrow edge of prosternum, acetabulæ and hind angle of mesopleuræ ochraceous. Rostrum and

legs clearer ochraceous; hind tibiæ and tarsi black, the anterior and intermediate embrowned; anterior femora thickened, armed below with two short teeth and a few minute serrations; anterior tibiæ moderately curved at base, hind tibiæ short-pilose with a row of about six slender spines beneath; tarsal I about as long as II and III together. Rostrum reaching to between the intermediate coxæ, dark ochraceous, becoming black at apex. Upper surface of insect normally clothed with sparse appressed pale hairs.

Holotype, male (No. 4215) and allotype, female (No. 4216), Mus. Calif. Acad. Sci., Ent., taken at Cumbres Pass, Colorado, at 10,000 ft. elevation, July 20, 1935, by Dr. E. C. Van Dyke, and one female taken by Dr. Van Dyke at Longs Peak Inn, Colorado, July 2, 1926, at 9000 ft., all presented to the Academy by the collector. This is a most interesting high mountain form recalling *rufipes* Stal but belonging to the genus Trapezonotus.

A Peculiar Structure in a Fulgorid

While studying some Hemiptera taken by Mr. Templeton Crocker on the Solomon Islands I found one possessing a structure quite new to me. This insect, a species of *Bennaria* pertaining to the subfamily Cixiinæ, has on each side a rod-like appendage articulated to the basal abdominal segment. It is as long as the width of the elytra at that point and at its extremity it is enlarged to a cup shaped container that is filled with a waxy secretion. This structure recalls the halteres found on the metathorax of the Diptera where they replace the hind pair of wings. These rods or balancers occur in two Indo-Australian genera of cixiids, *Benna* and *Bennaria*, but I know of no suggestions having been made relative to their functions. They must serve some useful purpose and an investigation of this would prove most interesting. One other genus of the Fulgoridæ, Achilixius, has two processes on either side of the basal abdominal segment but these are much shorter and apparently are not articulated, but they do carry similar cup-shaped depressions. Their functions, however, have not been worked out.—E. P. Van Duzee.

SOME NEW DELTOCEPHALOID LEAFHOPPERS (HOMOPTERA CICADELLIDÆ) FROM ILLINOIS

BY DWIGHT M. DeLONG

Ohio State University

Flexamia prairiana DeLong, n. sp.

Resembling *reflexus* in form and general appearance and previously confused with it but with distinct genitalia. Length 4-4.5 mm.

Vertex strongly produced, apex blunt, one-fifth longer at middle than basal width between eyes.

Color: Vertex yellowish with a dark ring at apex and the broken cross band before anterior margin of the eyes. Thorax yellowish with faint longitudinal striæ. Elytra yellowish, veins bordered with brown especially heavy along reflexed veins to costa.

Genitalia: Female last ventral segment rather deeply emarginate either side of median produced third which is rounded at apex and notched so as to form several minute teeth. Male plates long, tapered to pointed apices which are slightly divergent. Œdagus bearing three anteriorly directed apical processes as in the case of *reflexus* but differing by having no process on dorsal side and with the large process on ventral portion. Also in *prairiana* a smaller lateral process is finely serrate while in *reflexus* the large process bears two large spines near base.

Described from a series of 64 females and 47 males collected at Evergreen, Illinois, August 23, 1934 (Ross & DeLong); 9 females same locality July 1, 1935 (Ross & DeLong); 15 females and 16 males, Alsip, Illinois, August 23, 1935 (Ross & DeLong); 12 females and 6 males, Summit, Illinois, July 17, 1935 (Ross & DeLong); and 8 females, Zion, Illinois, August 7, 1935 (Ross & DeLong).

Holotype male, allotype female and male and female paratypes in Illinois Natural History Survey collection. Male and female paratypes in author's collection.

This species is common on the prairie and has been confused with *reflexus* which it closely resembles.

Polyamia rossi DeLong, n. sp.

Resembling *obtectus* in coloration and general appearance but with distinct genitalia. Length 3 mm.

Vertex bluntly angled, as long at middle as basal width between eyes.

Color: Face with two rows of fine arcs, the upper row visible on margin of vertex from above. Apex with a pair of proximal pale spots, a darker one next either eye. A black transverse band between anterior margins of eyes, broken at middle. Thorax pale brownish, a black spot back of each eye. Elytra white, veins bordered with brown and with brownish spots on middle of clavus and disc of elytra.

Genitalia: Female last ventral segment with side margins sloping to posterior margin which is almost truncate and dark margined. Side lobes of underlying membrane conspicuous. Male plates triangular, apices rather long, tapered to acute tips. Œdagus in ventral view with the ventral keeled edge usually conspicuous between plates. In lateral view it is long, slender on basal two-thirds, then suddenly enlarged, the ventral portion broadly curved, semicircular with a short apical process extending dorsally and anteriorly, and a basal dorsally directed spur.

Described from a series of 47 males and 28 females collected at Thomson, Illinois, June 30, 1935 (Ross & DeLong); 26 males and 17 females collected at Fulton, Illinois, August 22, 1935 (DeLong & Ross). Holotype male, allotype female, and male and female paratypes in Illinois Natural History Survey collection, Urbana, Illinois. Male and female paratypes in author's collection.

It is a pleasure to dedicate this unique species to Dr. H. H. Ross who has collected so much interesting material in this field and with whom the writer has spent so many pleasant hours in the field and laboratory during the past three seasons.

Polyamia dilata DeLong, n. sp.

Resembling *compactus* in form and general appearance but with the vertex slightly more produced, faint markings on vertex and with male œdagus distinct. Length 2.5-2.75 mm.

Vertex bluntly angled, a little longer at middle than basal width between eyes. Elytra short exceeded by last two visible segments.

Color: Face dark with pale arcs above. Vertex whitish, ocelli and a proximal anterior mesal spot black. A pair of proximal triangular spots just above apex pale brown or orange. Indications of a pale orange band at anterior margin of eyes, and a pair of oblique marks each side at base. Pronotum brown with pale longitudinal stripes. Scutellum pale brown. Elytra pale brown, veins broadly white heavily margined with dark brown.

Genitalia: Female last ventral segment broadly roundedly produced, with a slightly produced rounded lobe on central fourth. Lateral lobes of underlying segment conspicuous. Male plates long, concavely narrowed to acutely pointed apices. Male œdagus in lateral view with the body rather broad, scarcely narrowed anteriorly, posteriorly gradually narrowed to form a long narrow apical third which is produced caudally and curved dorsally.

Described from a series of 23 females and 22 males collected at Apple River Canyon, Illinois, August 22, 1935, by H. H. Ross and the author. Holotype male, allotype female and male and female paratypes in Illinois Natural History Survey collection. Male and female paratypes in author's collection.

Lævicephalus pravus DeLong, n. sp.

Resembling *unicolorata* in form and appearance but with distinct genitalia. Length 3-3.5 mm.

Vertex bluntly angled, a little wider between eyes than median length.

Color: Bright yellow unmarked, ocelli black, ovipositor black. Genitalia: Female last ventral segment roundedly produced, almost truncate. Male plates long, tapered to acute apices. Male œdagus in lateral view narrowed at half its length and tapered in a long thread-like attenuated apex. In ventral view broad at base, rapidly narrowed and produced, slightly enlarged just before apex and with teeth on the outer margin, apex bluntly pointed.

Described from a series of 70 females and 19 males collected at Des Plains, Illinois, from Prairie, Sept. 18, 1935 (Ross & DeLong).

Holotype male, allotype female and male and female paratypes in Illinois Natural History Survey collection, Urbana, Illinois. Male and female paratypes in author's collection.

THE GENUS CHLOROTETTIX (HOMOPTERA CICADELLIDÆ): SOME NOTES ON SYNONYMY

BY DWIGHT M. DeLONG

During the past few years several species of *Chlorotettix* have been redescribed. This has apparently been due to two factors. Either the species was originally described in another genus and was not recognized as a member of *Chlorotettix*, or the one who redescribed it was not familiar with the original description and specific characters. In order to clarify the

literature it seems advisable to discuss briefly the synonomy of these species.

Chlorotettix lucidus (Baker) originally described as a species of *Thamnotettix* was redescribed as *C. delta* Ball and as *C. acus* DeL. and Dav. *C. orbonatus* Ball was originally described as a member of *Thamnotettix* and was redescribed as *C. productus* S. and DeL. *C. fallax* S. and DeL. was described from the male sex only and was redescribed from females only as *C. latifrons* S. and DeL. by the same authors. The allotype of *C. latifrons* as described by Brown is therefore a synonym of *C. fallax.*

Brown recently made a study of the genus *Chlorotettix* and failed to recognize *melanotus* DeLong which was originally described as a variety of *tergatus* V.D. He therefore placed this southern form, *melanotus*, which superficially resembles *tergatus* so closely, under the name *fumidus* S. and DeL. After having mistaken *fumidus* he proceeded to redescribe it under the name *fuscus* Brown. He also failed to recognize *C. floridanus* DeL. and redescribed it as *C. rubidus* Brown. Although he cited the name *C. borealis* S. and DeL. he failed to recognize the identity and characters of this widespread species and redescribed it as *C. angustus* Brown. All these species except *fuscus* have been checked by the use of the male genitalia which have excellent diagnostic characters in this genus. A list of the species cited above is given with their synonyms.

C. lucidus (Baker), (*C. delta* Ball and *C. acus* DeL. and Dav.)
C. orbonatus (Ball), (*C. productus* S. and DeL.)
C. fallax S. and DeL., (*C. latifrons* S. and DeL.)
C. melanotus DeL., (*C. fumidus* as cited by Brown, not DeLong)
C. fumidus S. and DeL., (*C. fuscus* Brown)
C. floridanus DeL., (*C. rubidus* Brown)
C. borealis S. and DeL., (*C. angustus* Brown)

Our Double Number

Circumstances made it necessary for our Publication Committee to find another printer for the Pan-Pacific Entomologist. This change caused such a delay in printing the January number that it seemed best to publish a double number to cover the January and April issues. We regret the delay and trust it may not occur again.

Collection of Historical Material by the Pacific Coast Entomological Society

During the course of development of entomology in the western United States a great deal of historical material in the form of correspondence with entomologists the world over, pictures, itineraries, etc., has accumulated. Some of this has reached the laboratories of the California Academy of Sciences by one means or another but a great deal of it remains in the hands of individuals or is among the effects of deceased workers in the charge of persons ofttimes unaware of its value. To preserve and make this material available a collection was started by a Pacific Coast Entomological Society Committee of three members, E. P. Van Duzee, E. G. Linsley, and R. L. Usinger, which was appointed by President E. O. Essig at the 137th meeting on September 1, 1934. This committee purchased a four drawer standard metal filing case with funds contributed by members of the Society. A system of filing has been tentatively adopted which keeps the entire correspondence of an individual together, the letters being filed chronologically for each writer and alphabetically for the various writers making up an individual's correspondence.

Material already on hand in the laboratories of the California Academy of Sciences has been incorporated through the cooperation of those in whose care it has been entrusted. This will remain as a permanent loan with the proviso that it will always be located at the Academy and can be segregated as a separate collection at any time should circumstances make that desirable. It forms a basis for the collection and includes the correspondence of W. G. Wright, J. G. Grundel, E. P. Van Duzee and others with numerous photographs from various sources.

The original committee reported at the 139th meeting of the Society on March 3, 1935, and was enlarged to five members and made a permanent committee of the Society to pursue a uniform policy over a period of years. The Society takes this opportunity to solicit the interest and cooperation of all western entomologists in this work. Any information concerning suitable materal should be communicated to some member of the committee.

C. D. Duncan
E. G. Linsley
E. P. Van Duzee
R. L. Usinger, *Chairman*

ASILIDÆ, NEW AND OTHERWISE, FROM THE SOUTHWEST, WITH A KEY TO THE GENUS STICTOPOGON

BY J. WILCOX

(Continued from Vol. XII, p. 212)

Blepharepium secabilis (Walker)

This genus has not been reported from the United States previously. A key to the species is given by Bromley[1]. Specimens are at hand from the following localities.

[1] Ann. Ent. Soc. Am. 22: 279, 1929.

Ariz.; Mesa, VII-23-1928 (E. P. Van Duzee); Phoenix, August (D. K. Duncan); Pima County, VII-22-1927 (R. H. Beamer). N. Mex.: Luna County, VII-14-1934 (R. T. Kellogg).

Blepharepium is most closely related to *Diogmites* and is distinguished from it usually by the following characters (quoted from Bromley [1]); "posterior pulvilli much shorter than the elongate claws; scutellum without bristles". The claws and pulvilli of *secabilis* measure as follows: hind claw 35, pulvilli 15; middle claw 30, pulvilli 15; and fore claw 30, pulvilli 24; both claws and pulvilli were measured from base of pulvilli.

Lestomyia Williston

It is rather difficult to classify the species of this genus, but the one described below should be readily recognized. Five species in the genus have been described. Four from California and one from Wyoming, but the genus occurs all over the western part of North America. Several other new species are at hand, but they will not be described until larger and more representative series have been seen. The length of the pulvilli is believed to be of specific importance. Where measurements of the claws and pulvilli are given, those of the hind legs are used, and both the claws and pulvilli are measured from the apex of the fifth tarsal joint.

Lestomyia atripes Wilcox, new species

Male: Length 10 mm. Head black; cheeks, palpi, and proboscis shining; remainder densely pruinose with a slight tinge of yellow on the front. Hairs and bristles white except two of the eight bristles on ocellar tubercle, the hairs on second palpal joint and two or three bristles on underside of second antennal joint, which are black. Antennæ black; apex of second joint and base

of third slightly reddish; first two joints subequal in length; third as long as first two together, narrow on basal third, broadest at apical two-thirds, from which it narrows to apex; style truncate, about one-fifth as long as third joint, cylindrical, longer than broad and with a minute spine at apex.

Thorax black, largely covered with gray pollen; laterally, dorsocentral stripes and a pair of broad central stripes separated by a gray stripe of equal width, golden. Hairs white; bristles black except three humeral and one posthumeral which are yellowish; four presutural, two supra-alar, two post-alar and seven anterior and three posterior dorsocentral bristles. Scutellum covered with yellowish gray pollen, with eight marginal bristles, four blackish and four whitish. Pleuræ and coxæ covered with gray pollen; hairs and bristles white.

Abdomen black, largely covered with gray pollen; second to fifth segments with large lateral triangular black spots, widest basally and not reaching lateral or posterior margins; all segments with a central anterior smaller oval black spot; hairs and bristles white; four lateral bristles on first segment. Venter covered with gray pollen and white-pilose. Hypopygium reddish brown, as broad as long, white-pilose.

Legs dull black, except apical one-fifth of femora and about basal one-fourth of tibiæ, which are reddish; hairs white; femoral bristles and about one-half of the tibial white; most of tarsal bristles black. Claws black, very narrowly reddish at base; pulvilli whitish; empodium brown; pulvilli three-fourths as long as claws (15:20).

Alulæ pale yellowish with white fringe. Base of halteres brown, stem and knob pale yellow. Wings clear hyaline; veins, except at the base, brown; anterior cross-vein at four-seventh the distance from base of discal cell; fourth posterior cell slightly narrowed.

Female: Length 11 mm. Similar to male. Head slightly yellowish; apical three-fourths of ocellar bristles black. Thoracic and mesonotal bristles black except those on the humeri. Median and lateral black spots on the abdomen confluent basally; sixth and following segments shining black; eight brown spines at apex. Wings slightly brownish in area around discal cross-vein.

Holotype: Male, Grant County, N. Mex., III-31-1933 (R. T. Kellogg). Allotype: Female, same data. Paratypes: About 100 specimens, both sexes, same data as types, and IV-7-1933; Santa Rita Mts., Ariz., IV-8-1932 (D. K. Duncan); Superior, Ariz., April (D. K. Duncan), base of Pinal Mts., Ariz., March (D. K. Duncan); 30 of those from Arizona in D. K. Duncan's collection.

The largely black legs will distinguish this species from previously described forms.

Cophura sculleni Wilcox, new species

Male: Length 7 mm. Head black, densely pruinose, except cheeks narrowly, the palpi and the proboscis, which are black. Hairs and bristles white; mystax bristle-like, confined to oral margin; hairs of face fine and short. Face slightly diverging below; front nearly parallel-sided; face at antennæ about two-thirds width of one eye. First antennal joint one and one-half times length of second and narrower, both bearing white hairs, two of these bristle-like below on second joint; third joint one and one-half times the length of first two joints together, about as broad as second joint and narrowed on apical one-third; style short, slender, with a minute seta at apex, about one-sixth the length of third joint.

Mesonotum densely covered with pollen; humeri and anterior part gray, the remainder yellowish; hairs rather long, white; bristles yellowish, two presutural and the following fine ones hardly distinguishable from the hairs; two supra-alar, two post-alar, and four dorsocentral bristles mostly posterior. Scutellum densely pollinose, broad posterior margin shining black; two pairs of very fine yellowish bristle-like hairs on posterior margin. Pleuræ and coxæ densely pollinose, propleura and coxæ grayish; hairs and bristle-like hairs of hypopleura yellowish white.

Abdomen shining, narrow sides and venter covered with gray pollen; first segment and anterior one-fifth and sides of second black; remaining segments yellowish red; hairs yellowish white, rather long on the sides. Hypopygium shining black, concealed beneath sixth and seventh segments, not visible from above.

Trochanters black; femora except for a very small black spot at tip and tibiæ except apex (about apical one-fourth of hind tibiæ) shining yellowish red; tip of tibiæ and tarsi, except basal half of metatarsi which are reddish, brownish black; claws black, reddish basally; pulvilli light brown; hairs and bristles yellowish white.

Halteres yellow; stem at base brown. Alulæ brown, with a broad yellowish margin and fringe. Basal two-thirds of wings brown, the brown extending from apex of auxiliary vein obliquely across wing, filling out discal and fourth posterior cells; apex of wings hyaline; veins brown. Anal cell narrowly open; fourth posterior cell somewhat narrowed; anterior cross-vein at seven-tenths distance from base of discal cell; third vein branched beyond discal cross-vein.

Female: Length 7 mm. Very similar. Five erect bristle-like hairs on posterior margin of scutellum. Segments 6-8 of abdomen entirely shining reddish; apical spines brown.

Holotype: Male, Holbrook, Ariz., elevation 5,400 feet, VI-25-1931 (H. A. Scullen). Allotype: Female, Estancia, N. Mex., VII-9-1929; in Dr. S. W. Bromley's collection.

In Curran's key[8] this species would run to couplet 3, where it differs from *bella* and *sodalis* by the color of the thorax and the markings of the wings.

[8] Am. Mus. Novitates, No. 487, p. 5, 1931.

Atomosiella Wilcox, new genus

Small species resembling *Atomosia*, differing by having only four posterior cells and lacking scutellar bristles. Head nearly twice as broad as high; face about three-fifths the width of one eye; sides nearly parallel, narrowly carinate along eye margin, slightly concave at middle; oral margin and base of antennæ slightly elevated. Front deeply excavated, about one-third wider than face (in *Atomosia*, front coarctate, never wider at vertex than at antennæ); ocellar tubercle narrow, bearing a pair of divaricate bristles. First antennal joint twice length of second, third twice length of first two together and having a minute spine on upper side at apical three-fifths. Proboscis short, cylindrical, truncate at apex; palpi very slender and about as long as proboscis. Mesonotum about as broad as long; short, sparsely pilose, sparsely punctate, bearing a strong supra-alar and a postalar bristle. Scutellum sparsely punctate and with fine, short, sparse hairs. Metanotum with a few short hairs and bristles. Pleuræ somewhat bulging and in large part pruinose, sparsely pilose except hypopleura which bears a dense clump of bristle-like hairs. Abdomen short, broad, very densely punctate; hairs numerous but short, fine, and inconspicuous; four lateral stout, short bristles on first segment, two on second, and one each on third to sixth; seventh and the hypopygium and ovipositor more or less concealed by the sixth segment. Legs rather short and stout but not conspicuously thickened on any part. Petiole of marginal cell slightly longer than anterior cross-vein; branches of third vein broadly divaricate, anterior branch reaching wing margin well in front of apex and posterior one well beyond apex; first posterior cell open or closed at wing margin; third posterior cell (fourth in most genera) closed and petiolate, petiole about equal in length to anterior cross-vein; anal cell closed before wing margin; anterior cross-vein beyond middle of discal cell.

Genotype: *Atomosia antennata* Banks

Figure 2. Wing of *Atomosiella*, new genus (X-10)

Atomosiella antennata (Banks)

Atomosia antennata Banks, Can. Ent. 52: 66, 1920.

This species was described from two male specimens collected at Douglas, Ariz., August (L. H. Snow) and now on deposit in the Museum of Comparative Zoology. Marston Bates has kindly compared specimens with the types and has verified the generic status of the species. As there are some differences in the specimens and as the female has not been described, the following description is given:

Male: Length 5 mm. Head black, proboscis shining; face, front and occiput covered with yellowish white pollen (the face a sparse row of longer hairs on oral margin and more numerous shorter hairs, a pair of stouter long hairs a little above oral margin and shorter sparse hairs extending to antennæ; ocellar bristles black; occipital bristles yellowish white; beard and hairs of proboscis white. Antennæ black; first joint clothed with short yellowish hairs and one longer hair on anterior side; second joint with short black hair.

Mesonotum and scutellum rather bright metallic blue; hairs golden; bristles yellowish white. Pleuræ dark purple where bare of pollen; pleuræ and coxæ pruinose except greater part of mesopleuræ, metasternum, and pteropleura; hypopleural hairs yellowish white; hairs of coxæ whitish.

Abdomen, except first segment which is of same color as mesonotum, dark bluish green; hairs golden; bristles yellowish white.

Basal half of fore femora brown, apical half yellow; middle femora yellowish except a small brown spot above at base; hind femora entirely yellow. Tibiæ, except about basal one-third which is yellowish, and tarsi brown. Claws black, yellowish at base; pulvilli light brown; empodium brownish. Hairs yellowish, short, appressed, except a rather dense erect fringe on venter of hind tibiæ; bristles yellowish, except a long one on anterior side at apex of basal and second segments of fore tarsi; very short bristles on outer joints of fore tarsi, short bristles on outer three joints of middle tarsi, a longer bristle on next to basal segment on anterior side of middle tarsi, and bristles on last three joints of hind tarsi, black.

Base of halteres dull brown; upper stem and knob milky white. Alulæ yellowish with a yellowish-white fringe. Wings uniformly grayish hyaline; veins brown; anterior cross-vein at two-thirds distance from base of discal cell.

Female: Length 6 mm. Similar to male, abdomen broader. Femora entirely yellowish. Longer bristles on basal two joints of tarsi yellowish white, except anterior ones on fore tarsi.

Described from specimens collected at Phoenix, Ariz., August (D. K. Duncan).

Additional specimens of both sexes from the above locality and from Superior, Ariz., August (D. K. Duncan), in the writer's and D. K. Duncan's collections, and the following specimens in the University of Kansas collection: Belen, N. Mex., VIII-19-1927 (R. H. Beamer and P. A. Readio); Socorro County, N. Mex., VIII-18-1927 (P. A. Readio); Taos, Taos County, N. Mex., VIII-20-1927 (R. H. Beamer); and Lemon Cove, Calif., VII-26-1929 (R. H. Beamer).

There is considerable variation in the coloration of the specimens, the thorax varying from bright blue and purple to black and the abdomen in some specimens being nearly black; the color of the second antennal joint varies from dull yellow to nearly black; and in most specimens the femora are entirely yellowish, varying to reddish brown. The first posterior cell varies from being closed and very slightly petiolate to being open as wide as the length of the anterior cross-vein.

Atonia duncani Wilcox, new species

Male. Length 5 mm. Head black, densely pruinose, with a tinge of yellow on the face; mystax white, composed of six long bristles on oral margin and a number of short hairs; at about one-fourth distance from oral margin to antennæ is a pair of long black bristles, and on each side of face a vertical row of shorter white hairs reaching from oral margin nearly to antennæ. Front with a single black bristle on each side near eyes and just behind antennæ, and several short white hairs on sides of ocellar tubercle; ocellar tubercle with a pair of short black bristles; occipital bristles black, four short ones on each side; beard sparse, short and white. Antennæ black, thinly pollinose; first and second joints each with two short, black bristles below, subequal in length and about twice as long as broad; third joint bare, one and one-half times length of first two together, gradually widening apically, about one-fourth as wide as long at widest point; style about one-half width of third joint, somewhat conical, one-fifth length of third joint, with a short, stout bristle arising from upper side near base.

Mesonotum and scutellum shining black, rather densely covered with short, recumbent yellow hairs; bristles black, one presutural, one supra-alar, and one postalar; very narrowly pruinose on sides above wing base and posteriorly before scutellum. Scutellum without bristles. Mesonotum densely pruinose; on each side with a clump of about six short, stout, black bristles. Pleuræ densely pruinose, except neck, mesopleuræ, sternopleuræ, and ptero-

pleuræ, which are largely shining black; hairs short, white, hypopleural hairs long, about 10 on each side.

Abdomen black, shining, finely punctate; hairs white, longer posteriorly and on sides of segments; about four whitish lateral bristles on first segment.

Coxæ pruinose; fore pair black, middle and hind pairs more or less yellowish. Legs shining black, except the narrow base and apex of femora, about basal one-fourth of tibiæ, and the tarsal joints (becoming darker apically) which are dull yellow. Hairs and bristles white except bristles on outer tarsal joints which are black; a definite fringe of rather dense hairs ventrally on hind tibiæ and metatarsi; claws and empodium black; pulvilli yellowish.

Halteres yellow, base and lower stem brown. Wings hyaline, veins brown; anterior cross-vein before middle of discal cell.

Female: Length 5.5 mm. Similar to male. Oral bristles largely black; face and front with a more evident tinge of yellow; anterior cross-vein at middle of discal cell.

Holotype: Male, Globe, Ariz., July (D. K. Duncan). Allotype: Female, same data. Paratypes: 22 specimens, both sexes, with same data as type (July and August), and Superior, Ariz., August (D. K. Duncan), partly in D. K. Duncan's collection.

This is apparently the first record of this genus from the United States; Curran[9] figures the head and wing venation.

[9] North American Diptera, p. 168, fig. 42; p. 178, fig. 110, 1934.

This species apparently differs from *A. mikii* Williston by the shorter antennal style (*mikii*, one-third length of third joint) and by the color of the hairs on the mesonotum, and from *A. brevistylata* Williston, by the color of the legs and of the mystax and hairs on the mesonotum.

Promachina pilosa Wilcox, new species

Male: Length 14 mm. Head shining black, thinly covered with golden brown pollen; mystax and hairs of palpi yellowish white, becoming white on upper face; sparse erect hairs on front mixed black and white; hairs on ocellar tubercle largely black; beard and hairs on upper occiput and proboscis white; occipital bristles black, about eight on each side. Antennæ black; first joint white-haired and twice length of second; second with mixed short black and white hairs; third one and one-third times length of first two joints together, equal in width at base to width of second, tapering apically; style three-fourths the length of third joint.

Thorax and coxæ black, covered with golden brown pollen, subshining; mesonotum with a broad median, narrowly bisected, black stripe; recumbent hairs white, numerous interspersed black hairs erect; bristles black, two presutural, one supra-alar, and

three post-alar. Scutellum black, thinly covered with golden brown pollen with numerous long white hairs arranged in a clump on each side. Hypopleural hairs long, yellowish; a thinner clump of long black hairs on metasternum, and a few similar hairs above on hind coxæ.

Abdomen black, broadly brownish on sides, becoming still broader apically; hairs long, yellowish white, more numerous on the sides, black on dorsum of first segment. Genitalia black, about equal in length to fourth and fifth segments together, hairs yellowish white. Venter uniformly covered with brownish pollen, with short recumbent white hairs and on segments I-V with longer, sparse, erect black hairs.

Legs shining black; fore and middle tibiæ reddish brown on posterior side, hind femora reddish brown dorsally, hind tibiæ this color on about basal one-fourth. Hairs yellowish white, more or less recumbent, with some black hairs on dorsum of fore and middle femora, and dorsally and posteriorly on hind femora; bristles black; claws black; pulvilli brown; empodium yellowish.

Alulæ brown, margin yellowish, with numerous white marginal hairs. Knob of halteres brownish black; base and stem yellowish brown. Wings light brownish, more intense anteriorly; veins brown; first posterior cell open; fourth posterior cell closed and petiolate, also petiolate at base, these petioles about equal in length to anterior cross-vein; anal cell closed and petiolate, the petiole about one-half the length of anterior cross-vein; anterior cross-vein at five-ninths distance from base of discal cell.

Female: Length 14 mm. Similar to male. Hairs on sides of abdominal segments I-V white, yellowish dorsally except on I, where they are black; VI and VII and ovipositor entirely white-haired except tip of ovipositor, which is short yellow-haired; ovipositor black, about equal in length to fourth and fifth segments together. Wings nearly hyaline, yellowish anteriorly; petiole of anal cell about equal in length to anterior cross-vein; anterior cross-vein at middle of discal cell.

Holotype: Male, lower Sabino Canyon, Santa Catalina Mts., Ariz., elevation 3,200 feet, IV-6-1934 (D. K. Duncan). Allotype: Female, same data. Paratypes: Five females with same data as type; one female, Florence Junction, Ariz., elevation 2,200 feet, IV-7-1934 (D. K. Duncan); one male Sabino Canyon, Santa Catalina Mts., Ariz., August (D. K. Duncan), the latter male and two females in D. K. Duncan's collection; one female, Tucson, Ariz., IV-2-1934 (Bryant, 440), and two females, Ajo Mts., Ariz., IV-2-1934 (Owen Bryant), in Owen Bryant's collection. The specimens range in length from 12 to 14 mm.

Differs from *trapezoidalis* (Bellardi) by its smaller size,

partly reddish-brown femora, white hairs on scutellum, and absence of black bristles on scutellum. For key to species see Bromley[10].

There seems little doubt that this is the proper genus for this species. Because of the obtuse claws and general piloseness, it is more closely related to *Mallophorina* Curran; the longer genitalia and ovipositor (similar to those of *Promachus*), the more slender hind tibiæ, and the narrow second to fourth joints of the hind tarsi (in *Mallophorina* these joints are about twice as broad as long, while in this species they are about as broad as long) apparently exclude it from *Mallophorina*.

ECCRITOSIA ZAMON (Townsend)

This is apparently the Mexican species reported from Arizona by Schaeffer[11], and more recently from Texas by Bromley[12] as *E. amphinome* Walker. Curran[13] has recently shown differences between these two species and gives a key to the species.

The genus is closely related to *Proctacanthus* but differs in having the wings longer than the abdomen, the thorax more robust, the spines at the tip of the ovipositor extending over the entire dorsum of the apex of the eighth tergite, and the hairs on the sides of the first three abdominal segments longer and denser than in *Proctacanthus*. The third vein branches before the discal cross-vein, which separates it from most of the species of *Proctacanthus* found in the United States.

This species should be recognized by the following brief description:

Length 30 mm. Dark brown except hind tibiæ and tarsi, which are yellowish, and third and following abdominal segments, which are yellowish red. Hairs black except mystax and hairs on hind tibiæ and third and following abdominal segments, which are yellowish; hairs on sides of first four abdominal segments long and dense, mostly black on first two segments, strongly contrasting with yellowish hairs on apical part of second, and on third and fourth segments.

Described from specimens collected in the following localities: Roosevelt Lake, September (D. K. Duncan); Gila Valley, Graham County, August (D. K. Duncan); and San Carlos Lake, July (D. K. Duncan); all in Arizona.

[10] Bull. Am. Mus. Nat. Hist., 66: 352, 1934.
[11] Jl. N. Y. Ent. Soc., 24: 66, 1916.
[12] Ann. Ent. Soc. Am. 27: 106, 1934.
[13] Am. Mus. Novitates, No. 752, pp. 13-15, 1934.

A NEW APHID FROM CALIFORNIA[1] (HOMOPTERA—APHIDÆ[2])

BY E. O. ESSIG

The Pustulate Willow Aphid

Cavariella pustula Essig, n. sp.

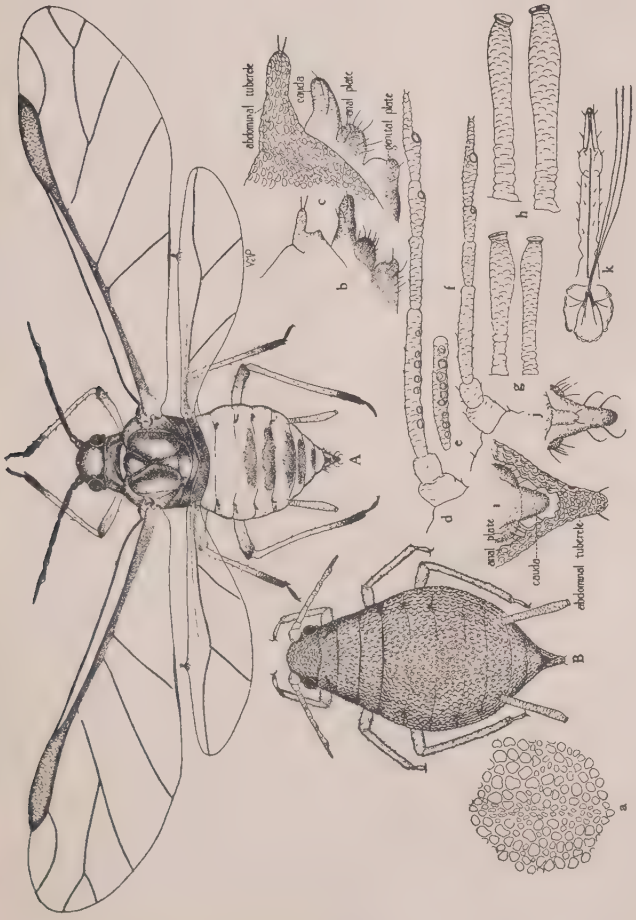
Apterous viviparous female. A small slender, flattened species in which the surface has a most curiously pitted appearance as shown in Fig. 1, B. The color varies from pale greenish-yellow to orange, with the tips of the antennæ, leg segments, including all of the tarsi, and the cornicles dusky. The tip of the abdomen is extended into a pointed tubercle which completely hides the cauda from above. The head is set into the thorax without special differentiation. Frontal tubercles developed; antennæ short, the length of the segments: I, 0.05 mm.; II, 0.03 mm.; III, 0.16 mm.; IV, 0.08 mm.; V, 0.07 mm.; VI, 0.17 mm. (base, 0.10 mm.; unguis, 0.07 mm.); total, 0.56 mm. The legs, especially the first pair, are short; the tibiæ being considerably dilated apically. Rostrum rather slender apically, extending to the third coxæ. The cornicles are long, narrow basally, swollen in the apical half, restricted at the tip to form a flanged opening. The outside margin is nearly straight whereas the inner margin is swollen so as to give the appearance of recurved organs. They extend slightly beyond the tip of the abdomen, being 0.39 mm. in length. The abdominal tubercle is pointed and terminated by two short lateral spines; including last segment, 0.16 mm. in length. Length of the body 1.6 mm., width 0.8 mm.

Alate viviparous female. Rather slender; the head and thoracic lobes are black; the remainder of the body pale greenish-yellow with two light green longitudinal stripes on the dorsum of abdomen in living specimens. The antennæ, tips of the tibiæ, the tarsi, and cauda are dusky; the cornicles concolorous with the abdomen. In mounted specimens dusky patches may be noted on the dorsum of the abdomen. The pustulate surface, so conspicuous in the apteræ, is only faintly so in the alatæ. The antennæ are shorter than the body, the lengths of the segments I, 0.07 mm.; II, 0.04 mm.; III, 0.29 mm.; IV, 0.16 mm.; V, 0.12 mm.; VI, 0.24 mm.; (base 0.14 mm.; unguis 0.10 mm.); total 0.93 mm. Large, and rarely small, circular secondary sensoria are arranged in a row on segment III. The number varies from 5 to 9 with 6 as the most usual. Rostrum extending midway between the second and

[1] The drawings were made possible through aid received from the WP.A.

[2] The writer has come to the conclusion that there is no longer any good reason why the superfluous spelling: APHIDIDÆ should be continued for the family name, and is therefore adopting the above form along with other modern aphidologists, as the correct family designation. Derived as it is from the Linnean genus *Aphis*, there appears to be no other alternative.

third coxæ. Legs short, tips of tibiæ and the tarsi black. Cornicles as illustrated, extending beyond tip of cauda; dusky; length 0.31 mm. Cauda dark; nearly pyramidal in shape; with 2 or 3 pairs of hairs; length 0.12 mm. Dorsal abdominal tubercle, small, ter-



minated by two short spines; 0.05 mm. long. Length of body 1.5 mm.; width 0.7 mm.; length of fore wing 2.6 mm.

This aphid has been collected only in several localities in the San Francisco Bay region on the tender shoots and undersides of the leaves of willow, *Salix* sp. The first specimens were taken by C. F. Roesling, February 28, March 1, and April 19, 1923. In March, 1925, Eric Walther found the same species in Golden Gate Park, San Francisco. I took a large series of specimens in Strawberry Canyon on April 19 and 29, 1935. The aphids occurred abundantly only on a single tree. E. A. Drews also collected specimens on willows growing in the rock quarry near Grizzley Peak Boulevard, Berkeley, March 27, 1936.

The species has been described from a large number of specimens designated as cotypes in the author's collection.

Cavariella pustula n. sp. is readily separated from other related species by the short unguis, the small number of secondary sensoria of antennal segment III of the alatæ, and the pitted surface of the apteræ.

Food Plant Records for two Epinotia Species

Epinotia johnsonana (Kearfoot). A series of six adults of this very striking brick-red species have been examined. These were reared from cream bush, *Holodiscus discolor* (Pursh) Maxim. during April and May, 1927 and 1934, by Mr. H. H. Keifer, from Phoenix Lake, Marin County, California. Apparently the food plant has previously been reported for this species.

Epinotia solandriana (Linn.) Mature larvæ of this species were first observed on April 5, 1936, rolling and feeding on the leaves of red alder, *Alnus rubra* Bong. in Strawberry Canyon, Berkeley, California. Adults first emerged on April 28, 1936. A previous record on crab-apple is reported by Heinrich, and European records of willow and birch. The determination of this species was kindly made by Mr. Carl Heinrich.—W. Harry Lange, Jr. March 22, 1937.

A PRELIMINARY STUDY OF THE GENUS STYLOPS IN CALIFORNIA (Part II)[1]

(Strepsiptera, Stylopidæ)

BY RICHARD M. BOHART

University of California, Berkeley

Seven species of *Stylops* have been recorded from California. In the present paper five new species are described. The variation existing among the females of a single species throws considerable doubt upon the validity of the numerous species which have been named in the past on the basis of single females. The chief difficulty arises from the fact that characters which are constant in the females of one species may be inconstant in another. Unless otherwise stated types of the new species are in the collection of the California Academy of Sciences.

The following key is necessarily cumbersome because of the rarity of unique specific characteristics. It is by no means intended to be final as many of the less common species have yet to be described.

Key to the Females of the Genus Stylops Recorded from California

1. Mandibles with a prominent basal tubercle (Part I, figs. 18, 21)[1] ..... *vandykei* Bohart
... Prominent basal tubercle lacking 2
2. Cephalothorax with the spiracles located very far back so that the distance between the spiracles and the apex is at least eight-tenths as long as the distance between the spiracles; cephalothorax longer than broad (figs. 14, 15, 18) ..... *elongatus* Bohart
... Cephalothorax with the distance between the spiracles and apex less than eight-tenths as long as the distance between the spiracles 3
3. With two transverse pigment spots on either side of the middle at the anterior limit of the spiracular region; cephalothorax narrowed strongly toward the apex; basal band darker on the posterior half, with the anterior margin wavy and indistinctly outlined (figs. 10, 11) ..... *apicalis* Bohart
... Without the above combination of characters 4
4. Cephalothorax longer than broad; wide at the mandibles; outer rim of the mandibles with a swelling just above the middle and with a usually discernible ventral tubercle above the swelling (figs. 17, 20) ..... *duboisi* Bohart

[1] A Preliminary Study of the Genus Stylops in California (Part I), Pan-Pacific Entomologist, Vol. XII, pp. 9-18.

... Without the above combination of characters.....5

5. Spiracular area transparent and well defined; anterior margin of basal band convex; cephalothorax broader than long (figs. 16, 19) .....*centroclarus* Bohart

... Without the above combination of characters.....6

6. Cephalothorax spade-shaped with the apical angles sharp; mandibles usually not incurved above the middle; anterior margin of basal band usually strongly convex.....7

... Cephalothorax more or less shovel-shaped with the apical angles very broad and rounded; or if not, mandibles incurved above the middle, or anterior margin of the basal band not convex 8

7. Lateral margins bent distinctly outward at the base of the head which is very broad (Part I, figs. 16, 22).....*timberlakei* Bohart

... Lateral margins straight or slightly convex from spiracles to apical angles; base of head relatively narrow (Part I, figs. 15, 20) .....*pacificus* Bohart

8. Spiracles prominent laterally; mandibles incurved beneath the strongly rounded outer apex; apex of cephalothorax broadly truncate .....*californica* Pierce

... Spiracles at most barely exceeding the margins; or if slightly prominent, mandibles not strongly rounded at outer apex, or cephalothorax not broadly truncate at apex.....9

9. Basal band much lighter on the posterior one-half, convex on anterior margin; rim of mandibles thick (figs. 12, 13) .....*heterocingulatus* Bohart

... Basal band evenly colored, not convex on anterior margin; rim of mandibles not unusually thick.....10

10. Lateral margins angled behind the spiracles; mandibles incurved below the outer apex, usually protruding over the margins of the apical angles of the cephalothorax (Part I, figs. 17, 19).....*medionitans* Pierce

... Lateral margins usually smoothly rounded behind the spiracles; mandibles not incurved below the outer apex, lying wholly within the outlines of the cephalothorax.....*subcandidæ* Pierce

Stylops centroclarus Bohart, new species

(Figs. 1, 5, 7, 16, and 19)

The male of *centroclarus* can be distinguished by the form of its aedeagus from all other described species with the possible exception of *cuneiformis* Bohart from which the shape of the scutellum readily separates it. The female differs from all other thus far described species by the clear, colorless, well-defined spiracular area. It belongs to the group of species para-

sitic on bees of the subgenus *Trachandrena* and may be further separated from *claytoniæ* Pierce and *hippotes* Pierce by its more prominent spiracles and its reduced area in front of the mandibles; and from *salicifloris* Pierce by the convexity of the anterior margin of the basal band.

Male. Black, abdomen fuscous, tarsi light. Antennæ relatively long, segments three to six with the length ratio 49:22:14:20 respectively. Metaprescutum broad and rounded, distinctly separated from the scutellum by a depressed scutal area; scutellum very broad posteriorly and evenly rounded toward the apex; postlumbium short and broad; postscutellum longer than the rest of the metathorax, broadly rounded posteriorly. Aedeagus very slender and angulate, bent at less than a right angle, apical margin slightly more than one-third the length of the main axis. Length excluding the antennæ, 3.35 mm.; length of antennæ, 0.97 mm.; width of head, 0.99 mm.; wing expanse, about 5.8 mm.

Female. Cephalothorax with a ferrugino-testaceous lateral margin extending inward as much as one-fourth the width of the thorax, central portion pale, spiracular area almost transparent, colorless, and bounded anteriorly by a transverse darkened area, basal band fuscous. Cephalothorax broader than long, apical margin straight, lateral margins irregularly convex, angled behind the spiracles; mouth hemispherical, area in front of mandibles very small, mandibles bluntly toothed apically, outer edge rounded, inner edge bent at the middle and straight from the bend to the apex; spiracles large and prominent; basal band evenly colored, half as long as wide, convex along the anterior margin, and more than half on the cephalothorax. Width of cephalothorax at spiracles, 0.97 mm.; width at base of mandibles, 0.35 mm.; width at base of head, 0.50 mm.; width at base of cephalothorax, 0.70 mm.; length from front edge of spiracles to apex, 0.64 mm.; length of cephalothorax, 0.90 mm.

Triungulinid. Body oblong-ovate, broadest at the middle; length of body excluding stylets, 0.156 mm.; length of stylets, 0.068 mm.; width of head, 0.034 mm.

Holotype, male, Berkeley, California, March 24, 1936. Allotype, female, Calaveras Dam, Santa Clara Co., California, April 14, 1936 (with triungulinids). Paratypes, one female, Berkeley, California, March 14, 1936; two females, same data as allotype All type material collected by G. E. Bohart.

Host. *Andrena* (*Trachandrena*) sp. near *salicifloris* Ckll. (det. by P. H. Timberlake) taken on blackberry and poison oak.

Stylops duboisi Bohart, new species

(Figs. 2, 3, 6, 8, 17, and 20)

The manner in which the fourth antennal segment arises from the third separates the male of this species at once. Also the sixth antennal segment is longer than the fourth and the prescutum is almost a perfect pentagon. The female is also easy to distinguish on the basis of the shape and uniform color of the basal band, the angled outline of the cephalothorax, the small size, and particularly the form of the mandibles.

In addition to the collection and donation of many other specimens, Mr. J. J. Du Bois furnished most of the type series of this species and I take pleasure in naming it in his honor.

Male. Black, abdomen fuscous, tarsi light. Antennæ with fourth segment inserted about half its length from the base of the third segment, fifth antennal segment bearing a distinct pore at the middle of the inner surface, antennal segments three to six with the length ratio 49:17:15:22 respectively; head relatively small, with a weakly sclerotized area dorsally in back of each antennal base. Metaprescutum almost a perfect pentagon, distinctly separated from the scutellum by a broad, depressed scutal area; scutellum broad and evenly rounded; postlumbium almost as long as wide; postscutellum longer than the rest of the metathorax, broadly rounded posteriorly. Aedeagus not strongly angulate, apical process relatively stout, apical margin about one-third the length of the main axis. Length excluding antennæ, 3.22 mm.; length of antennæ, 0.80 mm.; width of head, 0.77 mm.; wing expanse, about 5.4 mm.

Male puparium cap. Maxillæ represented by a pair of oval rings separated from each other by more than three times their diameter, mandibles separated by once and a half their breadth, eye sockets separated by three times their breadth.

Female. Cephalothorax testaceous, slightly darker toward the margins and lighter in the spiracular area, basal band fuscous. Cephalothorax longer than broad, apical margin straight, lateral margins nearly straight from the apical angles to an angle behind the spiracles; mouth oval, mandibles narrowed toward the apex and with a very small apical tooth, outer rim of mandibles not incurved but strongly swollen above the middle and with a hardly discernible ventral tubercle; spiracles exceeding the margins, large but flattened and receding into the cephalothorax; basal band more than half on the cephalothorax, evenly colored, half as long as wide, straight along the anterior margin. Width of cephalothorax at spiracles, 0.53 mm.; width at base of mandibles, 0.21 mm.;

width at base of head, 0.46 mm.; width at base of cephalothorax, 0.39 mm.; length from front edge of spiracles to apex, 0.37 mm.; length of cephalothorax, 0.56 mm.

Holotype, male, Davis, California, no date. Allotype, female, Davis, California, April 1, 1936. Paratypes, seven females, same data as allotype; one female, Davis, California, April 6, 1936, collected by the author. Unless otherwise stated, all type material was collected by J. J. Du Bois.

Host. *Andrena* (*Micrandrena*) sp. (det. by P. H. Timberlake) taken on willow.

Stylops elongatus Bohart, new species

(Figs. 4, 9, 14, 15, and 18)

The male of this species approaches *medionitans* Pierce in general appearance, but the scutellum of the latter is less rounded and the last antennal segment is considerably less than twice as long as the fifth. The female is unique in its great length of the cephalothorax in front of the spiracles. In extreme specimens this distance surpasses the breadth at the spiracles. The mandibles are peculiar and variable (two different types are illustrated). The apical area in front of the mandibles and the anterior margin of the basal band is usually convex.

Male. Black, abdomen fuscous, tarsi light. Head broad, eyes small; antennæ with segment four more than twice as long as five, segments three to six with the length ratio 50:23:10:19 respectively; maxillæ small, second segment relatively slender and shorter than antennal segment four. Metaprescutum rounded, separated from the scutellum by a depressed scutal area; scutellum very short and broad at the base; postlumbium wider than long; postscutellum longer than the rest of the metathorax, narrowly rounded posteriorly. Aedeagus slender toward the apex, not incised behind the process, apical margin bent at an obtuse angle below the inner process, apical process slender (tip of process broken in mounting). Length excluding antennæ, 3.05 mm.; length of antennæ, 0.79 mm.; width of head, 0.80 mm.; wing expanse, about 5.0 mm.

Male puparium cap. Maxillæ represented by a pair of oval rings separated from each other by twice their diameter, mandibles separated by once and a half their breadth, eye sockets separated by four times their breadth.

Female. Cephalothorax ferrugino-testaceous, lighter in the spiracular area which is bounded anteriorly by a transverse dark-

ened area, basal band fuscous. Cephalothorax longer than broad, apical margin not convex, lateral margins convex, strongly constricted behind the spiracles; area in front of the mandibles prominent, mouth oval, mandibles very bluntly toothed apically and with a very small lateral projection on the inner margin below the apical tooth, margin incurved on the outer side and with a prominent hump below the middle; spiracles exceeding the margins and placed very far back on the cephalothorax; basal band strongly convex on anterior margin and evenly colored. Width of cephalothorax at spiracles, 1.09 mm.; width at base of mandibles, 0.38 mm.; width at base of head, 0.61 mm.; width at base of cephalothorax, 0.68 mm.; length from front edge of spiracles to apex, 0.87 mm.; length of cephalothorax, 1.16 mm.

Holotype, male, Soboba Hot Springs, Riverside Co., California, February 26, 1936. Allotype, female, Riverside, California, April 26, 1934. Paratypes, five females, March and April in Riverside, California; two females, December and March respectively, Needles, California; and three females, Claremont, California. All type material was collected by P. H. Timberlake.

Host. The holotype and allotype were extracted from two specimens of *Andrena* sp. near *blaisdelli* Ckll. (*A. œnotheræ* Timberlake in manuscript). All paratypes were taken from *Andrena blaisdelli* Ckll. (det. by P. H. Timberlake).

Stylops apicalis Bohart, new species

(Figs. 10 and 11)

The two elongate transverse spots marking the anterior limit of the spiracular area will serve to distinguish the female of this species from *nubeculæ* Pierce and *swenki* Pierce which it resembles in general. Also, the unusual character of the basal band is outstanding.

Female. Ferrugino-testaceous at the sides, lighter toward the center; spiracular area bounded anteriorly by two elongate dark spots; basal band fuscous, becoming lighter toward the front. Cephalothorax as broad as long, strongly narrowed toward the mandibles, apical margin not convex at the middle, lateral margins convexly undulate; area in front of the mandibles prominent, mouth oval, mandibles incurved on the outer edge, outer rim not swollen above the middle but strongly calloused from the middle to the base, apical tooth large; spiracles small but exceeding the margins; basal band with anterior margin not well defined, irregular, depressed on each side of the middle. Width of cephalothorax

at spiracles, 1.07 mm.; width at base of mandibles, 0.40; width at base of head, 0.60 mm.; width at base of cephalothorax, 0.88 mm.; length from front edge of spiracles to apex, 0.75 mm.; length of cephalothorax, 1.07 mm.

Triungulinid. Body stout, oblong-ovate, head large. Length of body excluding stylets, 0.195 mm.; length of stylets, 0.092 mm.; width of head, 0.047 mm.

Holotype, female, Berkeley, California, April 17, 1935, G. E. Bohart collector. Paratypes, two females, Carmel, California, March 24, 1919; one female, Sausalito, California, May 2, 1920, C. L. Fox collector; one female, Berkeley, California, June 16, 1933 (with triungulinids), P. H. Timberlake collector.

Host. *Andrena saccata* Vier. (det. by P. H. Timberlake).

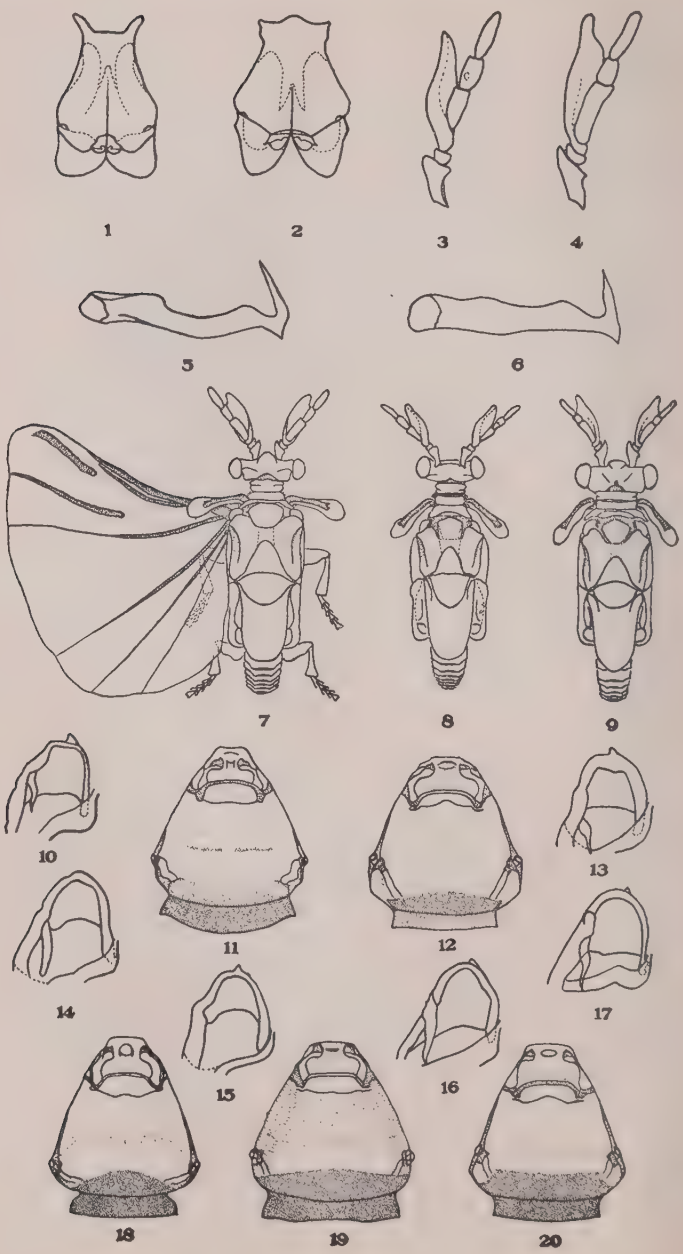
Stylops heterocingulatus Bohart, new species

(Figs. 12 and 13)

The odd coloration of the basal band and the thick-rimmed mandibles, which are often merely pointed, separate this species from *advarians* Pierce, *subcanidæ* Pierce, *claytoniæ* Pierce, and *vicinæ* Pierce which are somewhat similar in cephalothoracic outline. *Heterocingulatus* is the first species of *Stylops* to appear in the San Francisco Bay region where it occurs in February. In the Sacramento Valley it is most often taken in April.

Female. Cephalothorax ferrugino-testaceous, lighter in the spiracular area, basal band fusco-testaceous on the thorax, lighter on the abdomen. Cephalothorax a little longer than wide, apex straight at the middle, lateral margins convex, constricted at the base of the mandibles; mouth oval, mandibles with a thick rim which is incurved on the outer side and thickened below the middle, mandibles broad apically and strongly rounded at the outer apex, apical tooth small and not well defined; spiracles large but set in and hence not prominent laterally; basal band convex anteriorly, more than half on the cephalothorax. Width of cephalothorax at spiracles, 0.76 mm.; width at base of mandibles, 0.30 mm.; width at base of head, 0.48 mm.; width at base of cephalothorax, 0.52 mm.; length from front edge of spiracles to apex, 0.50 mm.; length of cephalothorax, 0.80 mm.

Triungulinid. Body slender, long oval. Length of body excluding stylets, 0.204 mm.; length of stylets, 0.094 mm.; width of head, 0.036 mm.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Holotype, female, Davis, California, April 1, 1936, J. J. Du Bois collector. Paratypes, one female, same data as holotype; four females, Yolo Causeway, Yolo Co., California, April 24, 1936; two females, Yolo Causeway, Yolo Co., California, May 4, 1936 (with triungulinids). All paratypes were collected by the author unless otherwise indicated.

Host. *Andrena pensilis* (Timberlake manuscript) and *Andrena* sp. near *angustitarsata* Vier. (Berkeley, California) (determinations by P. H. Timberlake).

Correction: In Part I of this paper, Pan-Pacific Entomologist Vol. XII, No. 1, on page 13, line 12, "prescutum" should be changed to scutellum" and in line 13 of the same page, the second "wide" should be changed to "long."

Explanation of Plate

Fig. 1. *centroclarus*, venter of male metathorax. Fig. 2. *duboisi*, venter of male metathorax. Fig. 3. *duboisi*, antenna. Fig. 4. *elongatus*, antenna. Fig. 5. *centroclarus*, aedeagus. Fig. 6. *duboisi*, aedeagus. Fig. 7. *centroclarus*, male. Fig. 8. *duboisi*, male. Fig. 9. *elongatus*, male Fig. 10. *opicalis*, female mandible. Fig. 11. *apicalis*, female cephalothorax. Fig. 12. *heterocingulatus*, female cephalothorax. Fig. 13. *heterocingulatus*, female mandible. Figs. 14 and 15. *elongatus*, female mandibles. Fig. 16. *centroclarus*, female mandible. Fig. 17. *duboisi*, female mandible. Fig. 18. *elongatus*, female cephalothorax. Fig. 19. *centroclarus*, female cephalothorax. Fig. 20. *duboisi*, female cephalothorax.

A New Locality for Grylloblatta

Upon a recent trip, November 27, 1936, through southern Oregon, I collected near Crater Lake, two specimens of the quite rare *Grylloblatta*, both females. To my knowledge this is a new locality, the nearest record being in Plumas County, California.

Both specimens were found beneath the same rock near a spring at an elevation of about 6500 feet. Further investigation produced no more individuals.

Although both females are only 16 mm. long, they appear to be mature and seem to be of the same species, *Grylloblatta campodeiformis*, described by Walker from Banff, Alberta in 1914.—James E. Elsea.

THE LIFE HISTORY OF GUARAX ARENE COQ. (DIPTERA-CHLOROPIDÆ), AN EGG PREDATOR OF THE BLACK WIDOW SPIDER, LATRODECTUS MACTANS (FABR.)

BY EDWARD L. KESSEL AND BERTA B. KESSEL

University of San Francisco

Gaurax araneæ is a dipterous predator of the eggs of the black widow spider, *Latrodectus mactans*. It is a common species in the San Francisco Bay region, and at Mill Valley some 40% of an extensive series of black widow egg sacs collected by the authors were found infested thereby. It does not appear to be solely a predator of *Latrodectus*, however. Essig (1926) states that it was reared from the egg sac of another spider, *Argiope riparia* Hentz many years ago. Its significance was not recognized at that time, however, as it was regarded as a scavenger. Its true predatory nature was first pointed out by Herms *et al* (1935) when it was found destroying the eggs of *Latrodectus* in several parts of California. No reports on the life history of this predator appear to have been published heretofore, with the exception of a recent, ably illustrated popular account by Jenks (1936). His report disagrees, however, on several important points with the results herein recorded.

The first adults used in the present study were reared from pupæ collected in the field. The breeding cages were kept in the laboratory where the temperature averaged 68° F. It was found necessary to feed the flies in order to get them to oviposit. This was done by placing a piece of banana or other fruit in the cage. Properly nourished flies oviposit readily on the surface of the spider's egg sac at any point. Each female lays from 15 to 25 eggs which measure approximately .5 mm. by .12 mm. The chorion is glistening white and deeply ridged longitudinally. The incubation period is six days. The newly emerged larvæ average .6 mm. in length.

Almost at once, following eclosion, the larvæ exhibit a tendency to migrate toward the suspending end of the egg sac, the path taken, however, being very erratic. At intervals along the way the larvæ pause and attempt to penetrate the fabric of the egg sac. Such attempts appear never to be successful, although a larva may spend several minutes standing on end trying to

force an opening with its mouthparts. Normally, entrance into the egg sac seems to be accomplished only by passing through the loosely woven primary layer of silk where it is left incompletely covered by the secondary tough protective coat at the suspending end. The larvæ perish on the surface if they do not succeed in making their way into the cavity of the sac within a few hours after hatching.

After gaining an entrance, the young larvæ begin feeding on the spider eggs. The larval period is eight days, pupation invariably occurring on the fourteenth day after the eggs are laid. The full grown larvæ vary in length from 3 mm. to 4 mm., depending upon their number and the number of spider eggs originally present in the egg case. (In one instance a number of flies were allowed to oviposit on the same egg sac and together they deposited about 400 ova. The number of spider eggs in the sac proved insufficient to supply nourishment for so many predators, for, after destroying all the eggs, the larvæ died without reaching maturity.)

When ready to pupate, the *Gaurax* larvæ pull apart the inner loosely woven fabric of the spider's egg sac, separating it from the tough outer covering so that the former comes to form a loose mass in the interior of the sac. The larvæ then tear away, at scattered points, the inner portion of the tough fabric so that it becomes extremely thin in these spots. Pupation occurs any place within the cavity, either next to the outer wall or suspended among the tangled strands of the inner sac. The pupæ measure some 3 mm. in length.

The pupal period lasts fourteen days. The emerged flies escape from the spider's egg case by forcing their way through one or more of the thinned regions prepared in the silken fabric by the larvæ.

Ordinarily, a black widow egg sac harbors only one brood of these predators. However, one sac was taken in the field which produced two broods of *Gaurax* with several days difference in their ages. Both broods were small, and it is probable that they were derived from eggs deposited by two females at different times.

Because of the relatively high incidence of infestation observed during this study of *Gaurax* on *Latrodectus*, it is evident that this fly is an important factor in reducing the number of

black widow spiders in the field. No infested egg sacs were taken from enclosed environments such as from under houses or in garages or outhouses. *Gaurax* therefore appears to be insignificant in the control of *Latrodectus* in human habitations where the latter is a particular menace to humans.

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NOTE ON ARGYNNIS SKINNERI HOLLAND
(Lepidoptera-Nymphalidæ)

BY WILLIAM HOVANITZ

University of California, Berkeley

In the revised edition of the Butterfly Book (p. 95) Dr. W. J. Holland (1931) makes the following statement: "The specific name *sakuntala* is dangerously near to *Argynnis sakontala* Kollar, which designates a race of *A. childreni* from the Himalayas. It would appear to be desirable to change the specific name, and in that case it would be most appropriate to name the form *A. skinneri* in honor of the first describer." In this statement and his use of *sakuntala* in other parts of his work, it seems to be obvious, though I may be in error, that Dr. Holland is not intending to rename *sakuntala* Skinner (1911) but is merely stating that it ought to be so named in case it is found necessary. However, in such cases we cannot quibble about what he meant or did not mean and must regard the name as being proposed, as has been done in the Zoological Record. *Skinneri* is not needed as *sakuntala* Skinner (1911) and *sakontala* Kollar (1844) are not from the same root and the former, therefore, is not a homonym. As a matter of form: *Arg. skinneri* Holland = *Arg. sakuntala* Skinner.

THE GENUS COMANTELLA CURRAN (DIPTERA, ASILIDÆ)

BY MAURICE T. JAMES

Colorado State College, Fort Collins

Examination of a splendid collection of Asilidæ made by Rev. Fr. Bernard Rotger, C. R., in the vicinity of Durango, Colo., has revealed a fourth species of *Comantella* Curran (1923). This is described in the present paper. I am indebted to Mr. J. Wilcox for the loan of specimens and for helpful suggestions, and to Mr. C. H. Martin for the loan of a male of *C. cristata* (Coq.).

Key to Species

1. Style one-third as long as the long slender third antennal segments; venter black-haired, at least on the anterior segments 2
... Style over half as long as the shorter, laterally gently convex, third antennal segment; venter wholly pale haired..... 3
2. Thoracic mane set on a definitely demarcated black vitta ..... *rotgeri*, n. sp.
... Medial vitta of thorax at most but poorly defined..*fallei* (Back)
3. Scutellum with 4-6 bristles..... *cristata* (Coq.)
... Scutellum with 10 or more bristles..... *pacifica* Curran

Comantella rotgeri James, new species

Close to *fallei* (Back); the mystax, however, is considerably coarser and is not white-tipped; the first antennal segment is more slender; the general body color is darker; the pale hairs and bristles are a deeper yellow, and the thoracic mane is set on a black vitta which is definitely demarcated from the pale-pollinose part of the thorax. The pale pile of the body is coarser but less dense than in *fallei*, and the pile of the venter is coarser and more extensively black. Otherwise, it agrees well with Curran's redescription of *fallei* (Canadian Ent., 58; 311-312), with the holotype of that species, and with series from several localities in eastern Colorado.

Holotype, ♂, Stollsteimer, Colo., 6500 ft., Oct. 29, 1935 (Rotger); allotype, ♀, same date; paratopotypes, 3♂, 2♀, same data; paratypes, 2♀, 1♂, Arboles, Colo., 6000 ft., Oct. 30, 1935 (Rotger); 1♀, Pagosa Junction, Archuleta Co. 6275 ft., March 16, 1936 (Rotger); 23♀, 19♂, Grand Co., N. M., Nov. 11-19 (R. T. Kellogg); 1♀, Silver City, N. M., Nov. 17, 1933 (R. T.

Kellogg); 2♂, Silver City, N. M., Nov. 17, 1933 (R. T. Kellogg); 21♀, 23♂, Medicine Hat, Alta., Canada, Oct. 14, 15, and 22, 1932, Mar. 18 and 25, 1933, and Apr. 1, 15, and 22, 1933 (F. S. Carr).

Stollsteimer (or Francis), which I do not find on the map, is, Father Rotger informs me, situated between the Piedra River and Nutrio Creek, 12 miles north of Arboles.

COMANTELLA CRISTATA (Coq.)

Only the female of this species has been described.

Male. Head black, clothed with whitish pollen; the mystax composed of black bristles, some of which terminate in yellow, interspersed with finer yellow hairs; the strong bristles of the vertex black, the stiff hairs of the vertex and front mostly yellow, with a few black ones interspersed; hairs of proboscis, cheeks, and occiput abundant, silky, yellow to white; antennæ and proboscis black. First and second antennal segments subequal, short, rather stout, with yellow hairs above and black bristles apically below; the third segment slightly longer than the first and second combined, carrot-shaped, broad basally and tapering apically; the style as long as the first two segments combined. Thorax black, yellow pollinose, with three stripes of white pollen on the dorsum behind the suture, the middle one extending to the base of the scutellum and spreading out to each posterior callus, the lateral ones disappearing about half way between the suture and the scutellum; a small white-pollinose spot on each side laterally behind the suture. The mane consists of dense, black bristles set on a glossy black vitta anteriorly (this merges, through yellow pollen, into the white-pollinose median vitta behind the suture); bristles of thorax, including legs, otherwise yellow, the pile also yellow. Scutellum with six black bristles and abundant silky pale-yellow hair, which extends anteriorly onto the thorax. Wings typical of genus. Abdomen black; the bases of segments two, three, and four, except laterally, the sides of all segments, and arcuate areas extending somewhat anteriorly from the posterior corners of the segments, pale yellow pollinose. Pile of abdomen entirely yellow, bushy on the sides and ventrally, short on the middle of the dorsum.

Neallotype, male, Mill Creek Canyon, Calif., Nov. 9, 1930 (C. H. & D. Martin), in Mr. Martin's collection.

I have the following records of other members of this genus. *C. pacifica* Curran; Moses Coulee, Wash., April 2, 1933 (C. H. & Dorothy Martin, J. Wilcox); Vantage, Wash., April 1, 1933 (C. H. & Dorothy Martin). *C. fallei* (Back): Kirk, Colo., April

7, 1933 (J. L. Hoerner); Ft. Collins, Colo., April 22, 1907; Denver, Colo., March 3, 1902, and Oct. 26, 1901 (S. A. Johnson); Colorado Springs, Colo., April 1, 1932, and April 5 and 14, 1930.

The peculiar seasonal distribution of the genus (very late fall, very early spring) is curious. Spring specimens appear too fresh to have undergone hibernation as adults. Possibly there is a partial emergence of the brood in the fall, with a continuance of the emergence the following spring.

NOTE ON THE COLEOPTERA FAUNA OF ALASKA

BY MELVILLE H. HATCH

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The two principal lists of Alaskan Coleoptera are those by Hamilton (Trans. Am. Ent. Soc., XXI, 1894, pp. 1-38) and Fall (Pan-Pac. Ent., II, 1926, pp. 127-154, 191-208). The former lists 572 species, the latter 448, including 117 species not in the former, so that the two together list 779 species. Scattered records, mostly compiled from the Leng Catalogue, raise this figure to 914. Of this number, however, 202 are without specific locality other than "Alaska," leaving a total of 712 species to be considered below.

	No. of species	Percentage of total (712)
Southeastern Alaska	403	57%
Only southeastern Alaska	256	36%
South of Alaska Mts.	628	88%
Only south of Alaska Mts.	566	79%
South central Alaska and Alaska Peninsula	355	50%
Only south central Alaska and Alaska Peninsula	163	24%
Aleutian and Pribilof Islands	104	15%
Only Aleutian and Pribilof Islands	18	3%
Central Alaska	156	22%
Only central Alaska	83	12%
North of Baird Mts.	03	0.4%
Only north of Baird Mts.	00	00%

These data are taken from a manuscript catalogue of the Coleoptera of Alaska prepared under my supervision by Miss Harriet Ruth Smith, a student at the University of Washington, employed by the Works Progress Administration.

NEW HORSEFLIES (TABANIDÆ, DIPTERA) FROM THE SOUTHWESTERN UNITED STATES

BY CORNELIUS B. PHILIP

Hamilton, Montana

A new variety of *Tabanus tetricus* Mart. (syn. *hirtulus* Big.) from southern Colorado and Arizona, and one new *Tabanus s. str.* from Arizona are herewith described. The red on the sides of both sexes of the first is so extensive as to suggest relationship to the *affinis* group, and more pronounced than any seen in a long series of typical *tetricus* from Montana and other northern localities. Until the male was associated, it was thought to be distinct, but I suspect that complete intergradation will eventually be found and the present name is offered to call attention to this extreme variation which would otherwise confuse assignment of individual specimens or small series from the region.

My reasons for considering *tetricus* and *hirtulus* synonymous, in spite of the respective difference of denudation and pollinosity of the subcallus, are given elsewhere (1935, 1936); the present variety is closer structurally to *hirtulus* but tinctorially to *tetricus*. Type material, unless otherwise mentioned, is in the collection of the author.

Tabanus tetricus rubrilatus Philip, n. var.

Antennæ dark red basally, black distad of the low prominence on the third segment; latter in ♀ chunky, rather wide, hardly excised, annulate portion short. Second palpal joints (♀) pale, creamy, strongly incrassate basally and tapering rapidly to a point. Ante-alar tubercles reddish. Abdomen dark reddish laterally with a broad, black irregular interval inclosing a row of pale discontinuous triangles, largest on the second segment, and an equivalent row of pale dashes superimposed on the red on either side, composed mostly of pale hairs. Wings hyaline, the costal and 1st M cells tinged with dilute yellowish, a pronounced spur on the "fork" of vein R5.

Female. Length 15 mm. Eyes hairy, with four green bands on a purple ground (relaxed). Front about three times as high as basal width, distinctly convergent, grayish pollinose with short

black hairs; callosity black, subquadrate, occupying full width of front and narrowly joined to a linear extension scarcely half the height of the front; ocelligerous tubercle small but distinctly brownish. Subcallus and face dark gray pollinose, the latter heavily pale pilose. Third antennal joint 1.14 mm. in total length by 0.5 basal breadth, the annuli 0.54 mm. Palpi about three quarters the length of the stylets, with many pale, and a few black hairs, 1.05 x 0.6 mm. in length and maximum thickness. Thorax dull black, with the usual gray lines; pleuræ smoky. Legs with all femora, the fore tibiæ distally and fore tarsi blackish, remainder dull red, darkening distally. Abdominal dorsal incisures pale-haired, interrupted narrowly by black on either side of the bases of the median triangles only. Red extending onto sides of first tergite, one-half or less its width, fading posteriorly on the fourth and fifth segments. Venter dull reddish covered with appressed yellowish hairs, darker distally.

Male, 15 mm. Differs from the ♀ in the usual sexual characters, the third antennal joint more slender and a little more excavated, 0.36 x 1.14 mm. in breadth and length, the annuli 0.54; the terminal palpal segments pale yellowish, subovoid, 0.48 x 0.9 mm. without the apical nipple of *T. hirtulus* allotype (Philip, 1936). Thorax blackish, the gray lines evanescent anteriorly. Red on sides of abdomen extensive on tergites II and III encroaching on IV, almost crossing I laterally and involving the first four sternites almost completely; the lateral pale dashes evident but not as prominent as in the ♀, the black intervals on tergites II and III subquadrate, somewhat widened behind. Outer fore tarsal claws about a fourth longer than the inner.

Holotype ♀, southern Colo., Aug. 9, 1935, 9500 feet, C. B. Philip. Allotype ♂, Cornet Creek, Telluride, Colo., July 9, 1919, about 10,500 feet. Paratypes, 2 ♀, same data as holotype; 3 ♀, Greer, Arizona, 8000 feet, June 25, 1926, C. T. Vorhies; 1 ♀, White Mountains, Arizona, July 28, 1926, R. B. Streets; 2 ♀, Custer Co., Colo., Aug. 9, 1928, 9000 feet, R. H. Painter; 5 ♀, Conejos Canyon, Conejos Co., Colo., July 6 to Aug. 9, 1932, G. M. Kohls. In the collection of the U. S. Nat'l Museum, the University of Arizona at Tucson, Kansas State College at Manhattan, Ohio State Museum at Columbus, The Rocky Mountain Laboratory of the U. S. P. H. S., and the author.

The Conejos specimens are the least extreme with the antennæ and palpi a little less chunky than in the holotype. The abdomen has an orange-brownish cast on the sides of well preserved specimens due to the heavy vestiture of black hairs outside the triangles, but in one worn specimen from Custer Co.,

Colorado, the red appears more pinkish and extensive, connected across the incisures, the triangles almost obliterated.

Separated from confusable members of the *affinis* group by the lack of faint clouds on the wings or of intense costal and basal infuscation, the presence of a long stump-vein, and the incrassate, more sharply pointed pale palpi.

Tabanus eurycerus Philip, n. sp.[1]

So closely resembles *T. laticornis* Hine as not to have been suspected until the males appeared. The eyes are glabrous, pattern (relaxed) two green bands on a purple ground (in male confined to area of small facets); antennæ bright red, annuli black, first joint a little swollen, third as wide as long, subrectangulate and slightly excised above, strongly bowed below; wings including the costal cell hyaline, "fork" of R5 not apppendiculate.

Female. Length 13.5 mm. Front a little over four times as high as the width of the callosity, convergent below, gray, the black, subquadrate callosity occupying its full width, except for a narrow line on either side, not normally joined to the spindle-shaped median callosity above. Subcallus, face and cheeks grayish pollinose and latter thickly covered with while pile. Palpi elongate, attenuated sharply and strongly incrassate basally on the second joint, pale creamy, many white and a few scattered black hairs. Disc of thorax dark gray with five paler lines covered with long gray pile and scattering, short, appressed rufous hairs (yellowish in *laticornis*). Antealar tubercles reddish, pleuræ gray pollinose and whitish pilose, tufts of white pile above the base of the wings. Legs dark, the fore tibiæ basally and the middle and hind tibiæ except at tips reddish. Abdomen reddish on the first three segments, superimposed by oblique whitish pilose spots, the rather broad black interval inclosing a median row of slender pale triangles widened abruptly on the posterior incisures. Venter reddish, darker from the fourth sternite caudally.

Male, 14 mm. Except for the usual sexual differences and a strongly attenuated abdomen, rather closely resembles the female. Area of enlarged facets strongly developed occupying a little less than three-quarters of the total area. Palpi yellowish, rather small, scarcely one and a half times as long as thick; very few black hairs. Abdomen dusty, pale brownish, the oblique lateral dashes accentuated much as the pattern seen in the males of *T. hirtulus*.

[1] Gr., broad horned.

Holotype, female, Santa Rita Mts., Ariz., 5 to 8000 feet, July. F. H. Snow. Allotype, male, southern Ariz. Aug., 1902. F. H. Snow. Both from the late Professor Hine as *T. laticornis* Hine. Paratypes, 1 ♂, Santa Rita Mts., Ariz., June 12, 1933. R. H. Beamer; in the Univ. of Kansas collection. One ♀ same locality, June 15, 1924, C. T. Vorhies in the Univ. of Arizona collection. One of each sex Chiricahua Mts., Ariz., 6200 feet, June 20, 1928, A. A. Nichol.

The bare eyes and hyaline costal cells of the wings will at once distinguish this from *T. laticornis* Hine.

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....., 1936. Tabanus rhombicus and related Western Horseflies. Can. Ent. 68:155.

A NEW SPECIES OF DENDROPHILUS FROM CALIFORNIA

(Coleoptera, Histeridæ)

BY EDWARD S. ROSS

University of California, Berkeley

Dendrophilus tularensis Ross, new species

Elongate oval, brownish piceous, surface dull, alutaceous. Head finely closely punctate, punctures separated by a space less than their width. Pronotum feebly convex; surface uniformly punctate, punctures large, interspaces as wide as their diameter; sides more finely and closely punctate, somewhat coarser along base. Elytra densely subevenly punctate over entire surface, punctures distinct deeply impressed, generally separated by spaces less than their width; inflexed portion very coarsely punctate, unistriate, stria confused medially; humeral stria deeply impressed, entire, carinate along outer edge; inner humeral feeble, short, medial; oblique humeral distinct, almost joining base of inner humeral; all dorsal striæ deeply impressed and broad at basal half, becoming weaker approaching apex and finally lost in the punctures at apical fifth; first dorsal longest, only slightly abbreviated at apex, others decreasing gradually in length from outer to inner; sutural stria as long as first dorsal and equally impressed. Pygidium coarsely punctate medially, punctures separated by half their own diameter; punctures at apex very fine and close. Punctures of metasternum very large and moderately close at coxal angles, becoming smaller and sparser medially, interspaces with occasional still finer punctures. **Length 3.5 mm., width 2.25 mm.**

Holotype (No. 4327, Mus. Calif. Acad. Sci., Ent.) collected at Kaweah, Calif. (Tulare Co.) May 10, 1931, by Mr. R. S. Wagner, to whom I am indebted for the privilege of studying this species.

This is the third species of this genus to be described from North America and the second from California. It is at once distingushed from the previously described species, *punctulatus* and *californicue* by its uniform strong punctuation and by the deeply impressed complete elytral striation.

The latter species, *californicus* Horn, described from Santa Clara Co., Calif., is rare in collections and the few records of its capture seem to indicate a wide distribution on the Pacific Coast. In the collectons of Dr. E. C. Van Dyke and Dr. F. E. Blaisdell I was able to study a good series of this species taken at San Francisco, Calif. in "rotting vegetation," one from Tuolumne Co., Calif. and another from Stockton, Calif. In the collection of Mr. H. B. Leech several specimens from Vancouver, B. C., were also examined; these were collected in a "culture of *Tenebrio* etc. in bran." The above series shows a remarkable uniformity in both size (L. 3 mm., W. 2 mm.) and sculpture.

I am grateful to the above mentioned individuals for their generous loan of material for this study.

Lawrence Bruner

It is with deep regret that we record the death of Lawrence Bruner which occurred January 30, 1937, at the home of his daughter in Berkeley where he has lived much of the time since he came to California in 1915. He was born in Catasauga, Pennsylvania, March 2, 1856, but most of his active life was spent in Nebraska where he was connected with the United States Entomological Commission and the Nebraska Experiment Station, and later was Professor of Entomology at the University of Nebraska. He will be best known for his systematic work on the Orthoptera in the study of which he followed Cyrus Thomas and Samuel H. Scudder. A good sketch of his life can be found in the March, 1937 number of the Proceedings of the Entomological Society of Washington. A bibliography of his entomological papers would be a most welcome supplement to that notice.—E. P. Van Duzee.

NEW SPECIES OF *ANDRENA* FROM CALIFORNIA (HYMENOPTERA)

BY P. H. TIMBERLAKE

Citrus Experiment Station, Riverside, California

The four black species of *Andrena* described herewith belong to the *pertristis-blaisdelli* group. The descriptions are submitted for publication at this time in order that Mr. E. Gorton Linsley may include an account of these species in his study of the black *Andrena* of California.

The types of the species described herewith are in the collection of the Citrus Experiment Station, Riverside, California, with the exception of those paratypes whose disposition is mentioned later under the respective species.

Andrena œnotheræ Timberlake, n. sp.

Closely allied and similar to *A. blaisdelli* Ckll., but somewhat larger, with finer punctures on the abdomen. In *blaisdelli* the punctures leave a broad, smooth margin at the apex of tergites 1 to 4; in *oenotherae* this smooth margin is comparatively narrow.

Female. Black, with entirely black hair. Head broader than long, the clypeus more produced than in *blaisdelli*. Facial foveæ very broad above, ending below in a broadly rounded point slightly below level of antennal sockets. Clypeus convex, shining, finely and closely punctured, without indication of a median smooth line. Remainder of face below antennæ shining, more finely punctured than clypeus. Frons longitudinally striate. Process of labrum with a triangular base and an apical prolongation that is longer than wide and is constricted where it joins the basal triangle. (In *blaisdelli* the apical part of the process is as wide as, or wider than, long, and shows no sharp differentiation from the basal part.) Malar space very short, but not so linear as in *blaisdelli*. Third antennal joint slightly longer than the next two joints combined. Flagellum very dark brown beneath, more reddish toward apex. Mesoscutum and scutellum very dull, finely and closely punctured, the punctures becoming slightly sparser and more distinct on the posterior middle of scutum. Mesopleura densely granular punctate. Enclosure of propodeum rather well defined and with a coarser wrinkling than in *blaisdelli*. Rest of dorsal surface of propodeum with a similar but finer sculpture than mesopleura. Sides of propodeum below the floccus more shining, finely punctured and hairy. Wings subhyaline, and prac-

tically as in *blaisdelli*, but larger. Abdomen shining, finely and closely punctured. The punctures of abdomen, especially of first tergite, obviously finer and sparser than in *blaisdelli*, and leave a very narrow smooth apical margin on the first four segments. On the first tergite the punctures are mostly about four or five puncture widths apart. Pygidium broadly rounded at apex, its surface planate. Pubescence abundant, but not dense enough anywhere to conceal the surface. On mesonotum the hair is mostly rather short and erect, with a few longer hairs intermixed. On the mesopleura it is considerably longer. Floccus of propodeum moderately short, rather dense and straight. Flocculus of hind trochanters long and curled. Scopa of hind tibiæ long and spreading, practically as in *blaisdelli*, the hair on the dorsal margin being long, erect and not at all plumose. Hair of tergite II to IV short and erect, moderately dense. Length, about 12.5 mm.; fore wing, 9.2 mm.

In the series listed below there is only slight variation in the characters described above, but the length varies from about 11 to 13 mm., and that of the fore wing from 8.5 to 9.5 mm.

Described from 16 females (holotype and paratypes) from the Gavilan, Riverside County, California, February 20 to March 20 (C. M. Dammers) and mostly, if not all, collected on flowers of *Œnothera* (the holotype collected March 20, 1932); and the following paratypes: 3 females, Riverside, on *Eriogonum fasciculatum* and *Cryptantha intermedia*, February 16 to March 25 (Timberlake); 1 female, on *Salix*, Soboba Hot Springs, February 22 (Timberlake); 3 females, Claremont (Baker); 1 female, Alamitos Bay, on *Oenothera spiralis*, May 6 (Timberlake); 1 female, 3 miles northwest of Newton, San Diego County, on *Cryptantha*, April 14 (Timberlake); 1 female, Azusa, (E. Holbirt); 1 female, 10 miles west of San Bernardino, May 26 (Linsley); 2 females, Mohave Desert, March 12 (Linsley); 1 female, 11 miles southwest of Victorville, Mohave Desert, on *Ericameria cooperi*, May 5 (Linsley); 1 female, San Francisco, April 20 (Linsley); 1 female, Oakland Hills, March 12 (Linsley); 1 female, Palmdale, April 11 (G. E. and R. M. Bohart); 1 female, Cave Creek, Chiricahua Mts., Ariz., July 4 (Linsley).

The paratypes collected by Mr. Linsley and by Messrs. G. E. and R. M. Bohart have been returned to their respective owners.

The male of *A. œnotheræ* is rather uncertain, hence the following material is not included in the type series, but a series of 18 males collected at Azusa by E. Holbirt probably belongs

with *œnotheræ*. They are very similar to what I have considered for a long time to be the male of *A. blaisdelli* Ckll. The latter has hair of head, pleura, propodeum, legs and abdomen black, that of the notum of thorax dull white. Hair of occiput, of first tergite, and often more or less at anterior end of cheeks also white. The Azusa males have the hair of head and thorax mainly dull white, with black hair on each side of face, on cheeks behind summit of eyes, and some on the antennal scapes and a little on pleura just below base of wings. Several of this series from Azusa, however, have hair of cheeks and pleura mainly black, and more than the usual amount on the scapes and sides of face, but still differ from *blaisdelli* males in having white hair on middle of face (especially clypeus) and on dorsum of propodeum. Hair of legs and abdomen black, but the long hair fringing the femora behind (very little on hind femora, however) and hair on first tergite white. In sculpture and structural characters, including genitalia, the two species are practically identical, except that in the putative *œnotheræ* male, the fourth antennal joint is somewhat longer than in *blaisdelli* and not greatly shorter than either the third or fifth joint. In *blaisdelli* the fourth joint on its short side is hardly longer than thick.

Andrena linsleyi Timberlake, n. sp.

This is another derivative of the *blaisdelli* group, and differs from *blaisdelli* and *œnotheræ* in having the clypeus much more sparsely punctured, the process of labrum differently shaped, and the mesoscutum distinctly less dull and more distinctly punctured. The scopa of hind tibiæ is also much thinner than in either of those species.

Female. Black, with entirely black hair. Head and foveæ as in *œnotheræ*. Clypeus more produced than in *blaisdelli*, and the malar space less linear. Clypeus convex, polished, sparsely punctured, with little or no indication of a medium smooth line, the punctures becoming closer on the lateral margins. Sides of face below antennæ very finely and densely punctured. Frons longitudinally striate on each side and rugulose in middle. Process of labrum triangular, rather broader at base than high, and with apex of the triangle narrowly truncated. Third antennal joint about equal to the next two combined. Flagellum dark reddish brown beneath. Mesoscutum dullish, finely and closely punctured, the punctures on posterior middle of disk about one to two punc-

ture widths apart with the interspaces very minutely tessellate. Scutellum similarly punctured and rather shiny at base. Mesopleura somewhat duller than the scutum and more obscurely punctured. Basal enclosure of propodeum well defined and finely rugose as in *blaisdelli*. The remainder of dorsal surface of propodeum very finely granular-rugulose and obscurely punctured. Sides of propodeum below the floccus slightly dullish, hairy but without distinct punctures. Wings hyaline, clearer than in *blaisdelli*, the venation and stigma nearly black. Abdomen shining, punctured almost as closely as in *blaisdelli*, but a little more finely on the first tergite. Punctureless apical margin of tergites II to IV rather wide as in *blaisdelli*, but very narrow on I. Pubescence in general as in *blaisdelli* and *œnotheræ*, but hair of clypeus thinner and the scopa of hind tibiæ remarkably long and loose. Length, about 12 mm.; fore wing, 8.5 mm.

Holotype female, from two miles north of Palm Springs, Calif., on *Hyptis emoryi* (not collecting pollen) March 7, 1936 (Timberlake). One female (paratype) Colorado Desert, near Needles, March 6, 1930 (E. G. Linsley), in the Linsley collection.

The paratype differs slightly in having the legs especially femora, the venter, the hair on under side of tarsi and the veins and stigma more reddish.

Andrena flandersi Timberlake, n. sp.

This insect is probably more similar to *A. irana* Ckll. than to any other previously described. It differs from that species in having the clypeus closely punctured, mesoscutum more coarsely and almost densely punctured, the punctureless apical margin of tergites extremely broad, etc. From *blaisdelli* and other similar species it differs in having the mesoscutum shiny instead of dull and in the wider smooth apical area on the tergites.

Female. Black, with entirely black pubescence. Head wider than long. Clypeus but little produced, moderately convex, shining, closely and deeply punctured. Side of face below antennæ and supraclypeal area finely and densely punctured. (In *irana* the whole face below the antennæ appears to be much more shiny because the punctures are considerably sparser). Frons longitudinally striate. Foveæ very broad, narrowed to a rounded point just below level of antennæ. Process of labrum with a low broadly rounded basal part and a median prolongation at apex. The latter portion is more or less bulbous, a little restricted where it joins the basal part, about as wide at apex as long, and depresso-emargi-

nate in the middle of the apical margin. Malar space linear. Third antennal joint as long as IV plus V. Flagellum only very slightly brownish beneath, toward apex. Mesoscutum and scutellum shining, strongly and very closely punctured, the punctures mostly not more than one puncture width apart. Mesopleura densely ruguloso-punctate. Dorsal surface of propodeum with similar but finer sculpture than mesopleura. The enclosure hardly defined except by the difference in sculpture, which consists of a fine wrinkling about as in *blaisdelli*. (In *irana* the enclosure is very minutely rugulose and dull like remainder of dorsal surface). Wings subhyaline, with blackish veins and stigma, the venation practically as in *blaisdelli*. Abdomen shining, polished, very finely punctured. Punctures of first tergite very sparse, so that the segment, unless carefully examined, almost appears to be impunctate. Next four tergites closely punctured about as *blaisdelli*, the punctured area reaching almost to the apical margin at the sides of the segments, but in the middle not extending on to the apical depression. Tergites II to IV each depressed in middle about two-fifths. Pygidium planate, broadly rounded at apex. Pubescence in general shorter than in *blaisdelli* or *irana*. On mesoscutum it is very short, erect and plumose, but much too sparse to conceal the surface. Tergite I with a few long hairs on lateral margins, but the disk almost nude. Tergites II to IV with short, erect hairs as in *blaisdelli* and *irana*. Scopa of middle tibiæ long and rather loose as in *blaisdelli*. (In *irana* the scopa is more compact and depressed.) Length, 11.5 mm.; fore wing, 8 mm.

Described from three females (holotype and paratypes) collected about 11 miles southwest of Victorville (on highway), Mohave Desert, Calif., at flowers of *Ericameria cooperi*, May 5, 1936 (Linsley and Timberlake). Also one female (paratype) without locality label that was given to me some years ago by Mr. Stanley Flanders, and which was probably collected in southern California. The specimens from *Ericameria* were not collecting pollen. The smallest paratype is 10 mm. long, with fore wing measuring 7.8 mm. One paratype collected by Mr. Linsley has been returned to his collection.

Andrena deserticola Timberlake, n. sp.

This species resembles *A. irana* Ckll. and *A. flandersi* Timb., differing from the former in the closely punctured clypeus, finely wrinkled enclosure of propodeum, much longer hairs on mesoscutum, more shining and morse sparsely punctured abdomen, etc. From *flandersi* it differs in having hair on the mesoscutum long, punctureless apical margin of tergites narrow, etc.

Female. Black, with black pubescence, the hair on inner side of tarsi dark reddish brown, and some of the hairs on mesoscutum, and dorsal margin of hind tibiæ and basitarsi with dilute pigmentation and appearing as if faded or bleached. Head shaped much as in *flandersi*, with the clypeus but little produced, moderately convex. Whole face below antennæ shining, finely and very closely punctured. The punctures on clypeus considerably coarser than on rest of face and mostly not more than one puncture width apart. Frons longitudinally striate. Foveæ and process of labrum as in *flandersi*, except that the apical prolongation of the process is rather broader than long, with parallel sides and emarginate apex but no groove down the middle. Third antennal joint somewhat longer than 4 and 5. Flagellum very slightly brownish beneath at apex. Mesoscutum polished, finely and closely punctured, the punctures mostly one to two puncture widths apart. Disk of scutellum like the scutum except that the punctures are a little coarser and sparser. Mesopleura moderately coarsely rugulose, without evident punctures. Dorsal surface of propodeum with a similar but finer sculpture. Enclosure clearly defined, finely wrinkled much as in *blaisdelli*. Sides of propodeum tessellate and shining, not distinctly punctured, except in area in middle of dorsal part next to the floccus. Wings subhyaline with dark stigma and veins. Venation about as in *blaisdelli*. Abdomen polished, very finely and moderately closely punctured. First tergite sparsely punctured, as in *œnotheræ*, but the punctures slightly finer. Next three tergites punctured a little more sparsely than in *œnotheræ*, the punctureless apical margin of the segments narrow as in that species. Pygidium planate, not so broadly rounded at apex as in the other species. Pubescence abundant, long, but not concealing surface, that on mesoscutum nearly as long as that on the pleura. Scopa with very long spreading hairs, about as dense as in *blaisdelli*. Hair on tergite I sparse and long, that on II to IV short and erect. Length, 11.5 mm.; fore wing, 8.5 mm.

Described from one female (holotype), collected at flowers of *Baileya multiradiata* (but perhaps not collecting pollen), one mile south of Adelanto, Mohave Desert, Calif., May 28, 1932 (Timberlake); and one female (paratype), collected at Palmdale, Calif., April 11, 1936 (G. E. and R. M. Bohart) in the Bohart collection.

The paratype measures 13 mm., due to the greater extension of the abdominal segments.

SOME NEW GENERA AND SPECIES OF NORTH AMERICAN PARASITIC BEES
(Hymenoptera)

BY E. GORTON LINSLEY AND CHARLES D. MICHENER

University of California, Berkeley

Protepeolus Linsley and Michener, new genus

Female. Head nearly as wide as thorax, inner orbits slightly converging below; antennæ with pedicel as long as second flagellar segment; first flagellar segment almost as long as second and third together; labrum bituberculate; mandibles with an inner tooth before apex; maxillary palpi short, about one-seventh as long as labial palpi, arising from a tubercle, three-segmented, first segment about one and one-half times as long as second, third slender, slightly longer than first; labial palpi elongate, four-segmented, first segment a little more than twice as long as second, last two short, together scarcely half as long as second, fourth shorter than third. Axillæ not dentate; scutellum weakly bilobed; fore wings with three submarginal cells, all approximately equal in length on cubital side, first recurrent vein practically meeting second transverse cubital, second recurrent vein slightly basad of third transverse cubital, marginal cell rounded and separated from costa at apex, a little more than two-thirds as long as discoidal cell; middle and hind legs robust, their tibial spurs rather short, stout; pulvilli nearly as long as the claws, enlarged at apex. Abdomen with a deep, transverse, ventral constriction near base, posterior face of constriction with an arcuate carina enclosing a semi-lunar area, a short distance behind which is a transverse, impressed line (suture?) extending completely across the sternite; fourth and fifth sternites truncate at apex; sixth exerted, tapering and narrowly rounded apically; fifth tergite medially emarginate at apex with a small, transverse, shining, false pygidial area within the emargination; sixth tergite greatly reduced in size, with a median ligulate, pygidial process, on each side of which is a row of stout, parallel spines interspersed with bristles.

Genotype: *Protepeolus singularis* n. sp.

This genus differs from all others known to the writers by the peculiar ventral constriction of the abdomen. Interpretation of the sclerites in this region is very difficult on the basis of the unique type, and it is not certain whether the first sternite ends in the constriction or at the transverse line behind the enclosed, semi-lunar area (see figure). The nearest relative of *Protepeolus* appear to be the South American *Isepeolus* and

Leiopodus, but it may be distinguished from these by the three-segmented maxillary palpi and the position of the second recurrent vein which is nearly interstitial with the second transverse cubital vein. From *Viereckella*, with which it agrees in the exposed, tapering, sixth abdominal sternite of the female, *Protepeolus* may be separated by the scale-like (rather than plumose) abdominal hairs, the ligulate pygidial process of the female, and the three-segmented maxillary palpi.

Protepeolus singularis Linsley and Michener, new species

Female. Black, with small amounts of red on legs and body, clothed with brownish and white pubescence which forms a pattern of spots and bands on the thorax and abdomen. *Head* with transfacial line considerably longer than facial line, surface shining, finely and not very densely punctured, pubescence sparse, whitish, except on vertex and frons where it is brown, short; antennæ suffused with reddish, flagellum darker above, scape red basally; clypeus with anterior margin narrowly red; labrum reddish; mandibles with basal two-thirds red. *Thorax* with punctation, where visible, somewhat coarser than that of head, tegulæ and tubercles red, scutellum, axillæ, and metanotum dark reddish; pronotum with a narrow posterior margin of white pubescence; scutum margined with white pubescence, clothed with dark brown hairs which are sparser posteriorly, anterior half of disk wth a clearly defined, longitudinal, cream-colored fascia which is swollen posteriorly and slightly broadened anteriorly to meet the marginal band; the marginal band, adjacent to tegulæ, produced to a point which extends inward and forward; scutellum clothed with brown pubescence, with a narrow, median, longitudinal band of white; axillæ and metanotum with some whitish pubescence; sides of thorax clothed with white hairs intermixed with patches of brown; wings grayish, a dusky streak along costal margin beyond marginal cell; legs red, coxæ blackish, under side of anterior femora suffused with blackish, underside of middle and hind femora at base, and most of inner side of hind tibiæ, including spurs, black. *Abdomen* black, apical margins of segments, first two segments at sides, sixth tergite at base, and most of sixth sternite, reddish; tergites very finely punctured, the fifth more closely so than the preceding; first tergite with a broad, transverse, cream-colored band of pubescence which is abruptly broken at middle; second and third tergites with a similarly colored basal fascia, that of the third tergite narrowed near the lateral margin; fourth tergite with areas of whitish pubescence at sides; fifth tergite with the apical portion slightly elevated, clothed with black hair, false pygidial area glabrous and impunctate, margined anteriorly by

a low carina; pygidial process of sixth tergite shining, with a low, median, longitudinal ridge; first to third sternites with whitish fasciæ on disk, those of second and third segments interrupted at middle; concavity at base of second sternite glabrous, impunctate, polished. Length 9.5 mm., anterior wing 6 mm.

Holotype female (No. 4344 Calif. Acad. Sci. Ent.), captured at Albuquerque, New Mexico, September 1-3, 1935, on *Sphaeralcea* (Michener).

This fine species may be easily distinguished from all other known Nomadine bees by the generic characters.

Hexepeolus Linsley and Michener, new genus

Head nearly as wide as thorax, inner orbits converging below; antennæ with pedicel nearly as long as second flagellar segment, first flagellar segment distinctly longer than second; mandibles with inner margin more or less evenly rounded, simple, without an inner tooth; maxillary palpi four-fifths as long as labial palpi, six-segmented, first segment slightly more than half as long as second, remaining segments becoming perceptably shorter and more slender to the apical segment; labial palpi four-segmented, first segment elongated, surpassing in length the remaining segments taken together, second segment approximately one-third as long as first, third segment about three-fifths as long as second, fourth segment subequal in length to third. Axillæ not dentate; scutellum convex, longitudinally impressed along median line, feebly bilobed; forewings with either two or three submarginal cells, if two, the cells are of about equal length on the cubital side, if three, the first cell is longer on cubital side than the second or third, the second smaller than the third and greatly narrowed anteriorly, marginal cell rounded and separated from costa at apex, a little shorter than discoidal cell; middle and hind legs only moderately robust, tibial spurs slender, pulvilli short, not distinctly enlarged at apex. Abdomen with tergites broadly depressed and densely pubescent along apical margin.

Female. Antennæ with first flagellar segment only a little longer than second; fifth abdominal tergite with a small false pygidial area; sixth tergite with a broadly rounded pygidial area, margined laterally by a carina; sixth sternite with a median keel between two concavities, apex bilobed, margined externally by a comb-like row of curved spines which become shorter, finer, laterally where they extend forward along the outer margins of the concavities.

Male. Antennæ with first flagellar segment subequal in length to the two following together; seventh abdominal tergite with a projecting, apically rounded, pygidial plate, the dorsal surface

of which is flattened, bounded by a carina; sixth sternite with a broad, transverse, discal groove.

Genotype: *Hexepeolus mojavensis* n. sp.

This genus presents the facies of *Argyroselenis*, *Epeolus*, or *Triepeolus*, sharing with them the apically rounded marginal cell which is distinctly separated from the costa. If differs markedly from these groups, however, in the long, six-segmented maxillary palpi, simple axillæ, and structure of the abdomen in the female (six visible sternites). In these last characters *Hexepeolus* agrees with *Nomada* and *Gnathias*, but may be distinguished from them by the closely appressed lateral margins of the first tergite (in *Nomada* and *Gnathias* these margins project as conspicuous, transparent, ventral flaps), the pubescent fasciæ of the abdomen, and the bilobed sixth sternite of the female.

The number of submarginal cells in the forewings is variable, several examples having only two such cells in one or both wings, although the normal number appears to be three. A similar condition exists in many other species of bees which are normally three-celled.

Hexepeolus mojavensis Linsley and Michener, new species

Black, sparsely clothed with white pubescence, denser on face, pleura, and venter, forming patches on notum and fasciæ on abdominal tergites. *Head* with transfacial line longer than facial line; antennæ black, suffused with reddish, particularly along under side of flagellum; upper frons and vertex moderately coarsely, subcontiguously punctured; face densely clothed with long white hairs; clypeus broadly truncate at apex, surface finely, closely punctured on disk, more coarsely at sides; labrum coarsely, irregularly punctured, with a longitudinal carina becoming evanescent at base; mandibles with apices reddish; segments of palpi with pale annulations. *Thorax* with scutum coarsely, closely punctured, the punctures averaging less than one puncture width apart, surface very finely, inconspicuously clothed with short, suberect, pale hairs in addition to the conspicuous white patches; pronotum, above tubercles, with a patch of dense white pubescence, tubercles coarsely punctured, clothed with white hairs; scutellum a little more closely punctured than scutum, with a dense patch of white hairs at the anterior angles; metanotum coarsely, closely punctured, clothed with long, white hairs; propodeum with triangular area nearly nude, finely, closely punctured, with a few oblique rugæ at base, remaining surface of propodeum coarsely, closely punctured, moderately densely clothed with long, white hairs;

mesepisterna very coarsely, closely punctured, irregularly clothed with suberect, white hairs; tegulæ reddish; wings lightly infuscated, veins brownish; legs clothed with moderately short, appressed hairs. *Abdomen* with dorsal surface clothed with fine, inconspicuous, prostrate, black hairs, apical margin of segments with broad bands of white pubescence, interrupted at middle to form separate fasciæ, first segment with a white patch on each side at base in addition to fasciæ; tergites coarsely punctured, the punctures averaging less than one puncture width apart; the depressed, pubescent apical margins more finely, closely punctured; sternites coarsely, closely punctured, moderately densely clothed with white hairs, broad apical margin of sternites reddish.

Female. Pronotum with tubercles reddish; scutum with a dense patch of white pubescence along median line from middle of disk to anterior margin, a short line on each side anteriorly, a small patch adjacent to tegulæ, and similar patches at posterior angles. Legs red, suffused with variable amounts of black on femora and tibiæ; abdomen red, first five tergites fasciate, the fascia of the fifth segment continuous; fifth tergite piceous to black, more uniformly punctured than preceding segments, the punctures moderately coarse and subcontiguous except on the small, transverse, false pygidial area, which is finely, shallowly punctured and densely clothed with fine, pale, silken pubescence; sixth tergite moderately densely clothed with white hairs except on pygidial area, which is finely, closely, shallowly punctured and sparsely clothed with very fine, short, inconspicuous, pale hairs; processes on each side of sting strap-like, black, densely pubescent; sixth sternite and margins of preceding sternites polished. Length 8 mm., anterior wing 6.5 mm.

Male. Pronotal tubercles black; scutum lacking median white patch, anterior angles with a vague spot of white hairs; legs black, with small amounts of red on femora, tibiæ, and tarsi; abdomen black, sides of first tergite reddish, tergites five and six with continuous white bands, that of the fifth notched at the middle; pygidial plate of seventh segment reddish. Length 8 mm., anterior wing 6.5 mm.

Holotype female (No. 4345, Calif. Acad. Sci. Ent.), captured at the junction of Deep Creek and Mojave River, Mojave Desert, San Bernardino Co., California, April 26, 1936 (Linsley). Allotype male (No. 4346, Calif. Acad. Sci. Ent.), from the same locality May 6, 1936 (Linsley). Paratypes, three females and twelve males with the same data as the allotype, one pair of which will be deposited in the collection of Dr. T. D. A. Cockerell at Boulder, Colorado, a pair in the Michener

collection, the remanider will be retained in the Linsley collection. Additional paratypes (5 ♀♀; 6 ♂♂) from the same locality and date are in the collection of Mr. P. H. Timberlake, at the Citrus Experiment Station. All examples were visiting flowers of *Eriodictyon trichocalyx*.

This species is closely related to the following and differs in the smaller size, dull, closely punctate frons, and the black legs of the male.

Hexepeolus rhodogyne Linsley and Michener, new species

Black, sparsely clothed with white pubescence, denser on face, pleura, and venter, forming patches on notum and fasciæ on abdomen. *Head* with its transfacial line longer than its facial line; face densely clothed with white pubescence; upper frons below ocelli polished, moderately coarsely but not closely punctured, the punctures averaging one or more puncture widths apart; clypeus broadly truncate at apex, surface finely, closely punctured on disk, more coarsely at sides; labrum coarsely, irregularly punctured, with a longitudinal carina which becomes evanescent at base; apical half of mandibles reddish; segments of palpi with pale annulations. *Pronotum*, above tubercles, with a patch of dense, white hair, tubercles coarsely punctured, clothed with white pubescence; scutum coarsely, closely punctured, the punctures averaging less than one puncture width apart and finer than those of vertex, surface finely, inconspicuously clothed with short, pale, suberect hairs in addition to conspicuous white patches at anterior and posterior angles; scutellum more coarsely punctured than scutum; metanotum coarsely, closely punctured, clothed with long, white hairs; propodeum with triangular area nude, finely, closely punctured, with a row of oblique rugæ at base, remaining surface of propodeum coarsely, closely punctured, moderately densely clothed with long, white hairs; mesepisterna coarsely, closely punctured, clothed with suberect white hairs; tegulæ red; wings lightly infuscated; legs red, clothed with moderately short, white hairs. *Abdomen* clothed with fine, prostrate, black hairs on dorsal surface, depressed apical margin of segments with broad bands of dense white pubescence, interrupted at middle to form separate fasciæ; tergites coarsely punctured, the punctures averaging less than one puncture width apart; sternites densely clothed with white pubescence, closely punctured except for the polished, reddish, apical margins.

Female. Antennæ red, apical segments of flagellum dusky; tubercles of pronotum reddish; scutum with at most a feeble median white patch of pubescence; abdomen red with third and fourth tergites darker, the fifth and sixth tergites piceous except for pygidial and false pygidial areas; fifth tergite with a small,

shallowly punctured, false pygidial area, which is clothed with fine, pale, silken pubescence; sixth tergite moderately densely clothed with white hairs except for pygidial area which is very finely, shallowly, closely punctured and sparsely clothed with fine, short, inconspicuous pale hairs; sixth sternite polished. Length 9 mm., anterior wing 7.3 mm.

Male. Antennæ black, lightly suffused with reddish, especially along under side of pedicel and first flagellar segment; tubercles of pronotum black; abdomen black, the sides of the first tergite reddish, the white band of tergite five broken at middle, that of tergite six continuous; pygidial plate of seventh segment black. Length 10 mm., anterior wing 7.3 mm.

Holotype female (No. 4347, Calif. Acad. Sci. Ent.), taken two miles east of Cathedral City, Riverside Co., California, April 10, 1936 (Linsley), and allotype male (No. 4348, Calif. Acad. Sci. Ent.), from Palm Canyon, Borego Valley, San Diego Co., California, March 29, 1936 (Linsley). Paratypes, two males, taken at the same time and place as the allotype, in the collection of Mr. P. H. Timberlake. All four examples were visiting flowers of *Larrea glutinosa*.

The differences between this and the preceding species may be brought out in the following table:

FEMALES

Upper frons, below ocelli, dull, uniformly closely, subcontiguously punctured, the punctures averaging much less than one puncture width apart; antennæ black, lightly suffused with reddish on under side of flagellum. 8 mm. Mojave Desert, California..... *mojavensis*

Upper frons, below ocelli, shining, irregularly, not closely punctured, the punctures averaging one or more puncture widths apart; antennæ red. 9 mm. Colorado Desert, California..... *rhodogyne*

MALES

Upper frons, below ocelli, dull, uniformly closely, subcontiguously punctured, the punctures averaging much less than one puncture width apart; legs black, with small amounts of red; pygidial area reddish. 8 mm. Mojave Desert, California..... *mojavensis*

Upper frons, below ocelli, shining, irregularly, not closely punctured, the punctures averaging one or more puncture widths apart; legs red; pygidial area black. 10 mm. Colorado Desert, California..... *rhodogyne*

Paranomada Linsley and Michener, new genus

Female. *Head* distinctly narrower than thorax, inner orbits slightly converging below; antennæ short, flagellar segments subequal in length, wider than long, the first slightly longer than the following; vertex polished, impunctate; frontal carina wanting; mandibles simple; maxillary palpi shorter than second segment of labial palpi, five-segmented, basal segment very short, second segment as long as the following two together, third segment two-thirds as long as second, fourth segment one-half as long as third, fifth segment slightly shorter than the fourth, the two together approximately as long as third segment; labial palpi four-segmented, first segment surpassing in length the remaining segments taken together, second about one-half as long as first, last two segments subequal in length, together about one-half as long as second. *Thorax* broad and dorso-ventrally compressed; scutum more or less flat, highly polished; scutellum large, flat, level with scutum, also highly polished; tegulæ large, shining; mesosternum broad, flat, shining, with a pair of sutures running anteriorly from mid coxæ and meeting at about middle of segment; coxæ drawn out externally in the form of a prominent lamella, fore coxæ not spined, middle and hind coxæ with a dorsal carina; legs short, stout, pubescent, femora flattened; wings infuscated, anterior pair with three submarginal cells. *Abdomen* polished, tergites two to four with broad, continuous, bands of white pubescence along apical margins, white band of fifth tergite interrupted at middle, sixth tergite with a broadly truncate pygidial area; sternites polished, moderately pubescent, sixth sternite retracted, represented externally only by a pair of projecting, slightly curved processes, bearing on inner sides a few inconspicuous spines.

Genotype: *Paranomada nitida* n. sp.

This genus is apparently related to the West Indian *Nomadosoma* Rohwer[7] with which it agrees in the smooth, shining integument, flat scutum and scutellum, indistinct frontal carina, and fasciate abdomen, but differs in the short five-segmented maxillary palpi, dusky wings with three submarginal cells, and short flagellar segments of the antennæ (the first scarcely longer than the second segment). From the Argentinan *Brachynomada* Holmberg[8] which has five-segmented maxillary palpi, *Paranomada* may be distinguished by the absence of a frontal suture, the broad, flat, highly polished thorax, and the short flagellar

[7] Rohwer, S. A., 1911, Ent. News 22:24-27, figs.
[8] Holmberg, E. L., 1886, Ann. Soc. Ci. Arg. 22:239.

segments of the antennæ. The peculiar structure of the coxæ, which are drawn out externally in the form of a conspicuous lamella, is unlike that in any other Nomadine bees which we have seen.

Paranomada nitida Linsley and Michener, new species

Female. Reddish brown, shining, clothed with white pubescence. *Head* nearly glabrous on vertex; antennæ piceous, scape and pedicel reddish; frons and clypeus irregularly clothed with white hairs, surface with a few scattered punctures; labrum very densely pubescent; mandibles reddish, edges piceous. *Thorax* shining; pronotal tubercles clothed with white pubescence; scutum nearly glabrous and impunctate, disk suffused with brownish; scutullum glabrous, impunctate; metanotum feebly shining, finely, closely punctured, densely pubescent at sides; propodeum with triangular area glabrous at middle, densely pubescent at sides, remaining dorsal surface, except a small area on each side of triangle, densely clothed with prostrate white pubescence; mesepisterna densely clothed with white hairs; anterior coxæ and mesosternum moderately sparsely punctured and pubescent; legs shining, femora sparsely, but distinctly punctured, sparsely clothed with long, white pubescence, tibiæ and tarsi rather densely pubescent; wings brownish, with a pale area before apex. *Abdomen* shining, first tergite glabrous, very finely, sparsely punctured except apical depression which is moderately finely punctured and sparsely clothed with short, fine, inconspicuous brownish hairs, second tergite finely, sparsely punctured and pubescent, apical depression and lateral margins with a broad band of white pubescence, interrupted at middle, third and fourth segments similarly punctured, although a little more densely pubescent, apical white fasciæ continuous; apex of fifth tergite fine, closely punctured and pubescent; pygidial area with a piceous, elevated margin and a median, longitudinal ridge; sternites moderately clothed with long, white hairs, denser on fifth segment. Length 7.5 mm., anterior wing 6 mm.

Holotype female (No. 4349, Calif. Acad. Sci. Ent.), from Phoenix, Arizona, October 23, 1924 (J. D. Gunder), in the collection of the California Academy of Sciences. The wrietrs are indebted to Mr. E. P. Van Duzee for the privilege of studying this interesting species.

Paranomada nitida shares many characters with the West Indian *Nomadosoma pilipes* (Cresson),[9] from which it may be distinguished by the five-segmented maxillary palpi, infuscated

[9] Cresson, E. T., 1865, Proc. Ent. Soc. Phil. 4:183.

wings, three submarginal cells, and the arrangement of the abdominal fasciæ. In *N. pilipes* there are pale fasciæ on the middle of the first, second, fourth, and fifth tergites, that of the fourth segment being interrupted at the middle.

NOTES ON THE DYTISCID BEETLE, *AGABUS LINEELUS* (LEC.)

Agabus lineellus (LeConte) seems to be of such scarcity, at least in collections, as to merit the following notes.

On March 29, 1936, while collecting on the University Farm at Davis, California, I had the good luck to take eight specimens of *Agabus lineellus*. The creek from which these specimens were obtained runs along the southern border of the farm. At that time of the year the creek consisted of muddy, stagnant pools that were scattered along its course. There happened to be an old burlap sack lying in the edge of one of the rather large pools and on pulling this out I discovered that a number of dytiscids had been hiding under it. These beetles became active at once and started crawling back into the water. However, I succeeded in capturing eight of them. These specimens remained in my collection until a few months later when I gave four of them to Hugh B. Leech who identified them as *Agabus lineellus* (Lec.).

The specimens agree perfectly with the description in Dr. H. C. Fall's paper of 1922, "A Revision of the North American Species of *Agabus*". They are readily separable from *A. disintegratus* (Cr.) which is the only other vittate species of the genus known to occur in California.

To show past recorded history of this species the following extract from Dr. Fall's paper is cited . . . "This very rare species is represented in the LeConte collection by the unique type taken by Murray in California, precise locality not stated. Aside from the type I have seen only a single example collected by G. R. Pilate at Mills College, California and sent me for identification by Mr. Dury, who retains a second specimen in his own cabinet."

Out of the series of eight specimens, three males and one female are in the H. B. Leech collection, two males are in Dr. E. C. Van Dyke's collection and a male and female are retained in my own collection.—Burdette E. White, University of California.

TWO NEW MAYFLIES FROM THE PACIFIC COAST

BY W. M. UPHOLT

University of California, Berkeley

During the months of June and July, 1936, the author collected ephemerids in the San Joaquin Valley. Two species were especially plentiful. A *Hexagenia*, the first member of this genus to be reported from any of the Western States, was collected in large numbers around lights over a period of ten days or two weeks, after which only an occasional lone specimen was found. A species of *Callibætis*, however, could be found in fair numbers around lights throughout the summer.

These two species, belonging to the families Ephemeridæ and Bætidæ respectively, are here described for the first time. I wish to acknowledge the invaluable assistance given me by Dr. Jay R. Traver of Cornell University who so kindly compared these specimens with closely related species and added much to the descriptions as they finally stand.

Hexagenia californica Upholt, new species

A yellow species, marked prominently with reddish-brown; outer margin of hind wing usually dark-bordered; ventral triangles attain anterior margin. Size: Male, body 17-20 mm., wing 17 mm., caudal filaments 47-50 mm.; female, body 20-25 mm., wing 18-22 mm., caudal filaments 25-35 mm.

Male: Head yellowish; eyes yellow above. Pronotum pale yellow with two dorsal dark red-brown stripes on either side of median line; dark reddish-brown spot between fore coxæ. Terga and pleura of meso- and meta-thorax pale yellow except for the reddish-brown lateral margin of mesoscutum, reddish-brown tip of mesoscutellum, and a reddish-brown streak extending from the base of the wing antero-ventrally through the pleurotrochantin. Meso- and meta-sternum reddish-brown, grading to yellow marginally. Fore legs dark red-brown, the femora lighter than tibiæ and tarsi. Middle and hind legs yellow with a greenish tinge; claws, distal tarsal segments except at base, and joints of other tarsal segments light purplish-brown. Wings hyaline, the costal margins tinged with reddish-brown; veins piceous, many cross veins margined with reddish-brown. Outer margin of hind wing usually with a prominent reddish-brown border. Abdominal tergites pale yellow, suffused with red except medially and on lateral

margins. Dark Indian-red brown streaks medianly and on each tergite from antero-lateral margin to posterior border medianly. Abdominal sternites pale yellow except for a reddish-brown triangle that extends to the anterior margin. Genitalia reddish-brown, second segment of forceps yellowish basally. Penes more or less hook-like, similar to those of *occulta* Walker. Caudal filaments pale reddish-brown, distinctly darker at joints.

Female: Very similar to male but much lighter in color, sometimes being nearly white. Wings occasionally all yellow with very little brown pigmentation. Fore legs rather uniformly reddish-brown, much shorter than in the male. Larger in size but with shorter caudal filaments.

Egg masses large, pale yellow-orange.

Holotype: (Dried male imago) No. 4350, Calif. Acad. Sci. Ent., taken June 30, 1936, at Kingsburg, Fresno County, California, by Upholt. Allotype: (Dried female imago) No. 4351, C. A. S. Ent., and a series of paratypes as follows: (In alcohol) 2 male subimagoes, 21 female imagoes; (dried) 1 male subimago, 15 female imagoes, and 3 female subimagoes, June 23-July 6, 1936; same locality as holotype; in the collection of the California Academy of Sciences, J. R. Traver, and the author.

This species may be distinguished from *occulta* Walker by its paler color generally and by numerous differences in the color pattern of the thorax. In color this species more nearly approaches *marilandica* Traver from which it differs in its larger size, in having the outer margns of hind wings margined, and in the ventral abdominal triangles which attain the anterior margin.

Callibaetis traveræ Upholt, new species

Male yellowish white marked with brown; female pale reddish-yellow; cross veins intermediate in number; marginal intercalaries single; wings of male unpigmented; vitta of female wing discontinuous. Size: Male, body 5.5-7 mm., wing 7 mm., caudal filament 10 mm. or more. Female, body 6-7 mm., wing 8 mm., caudal filaments 10 mm. or more.

Male: Head and thorax deep Van Dyke brown; sclerites margined in pale brown; pleura somewhat lighter in color than notum. (In alcoholic specimens, this difference between notum and pleura is more pronounced, both being much lighter and with more of a yellow tinge; also groups of two or three reddish-brown dots are present on the pleura just above each leg and below each wing

base). Eyes deep brown, lower half piceous. (Upper half of eyes yellow in alcoholic specimens). Legs white with very faint indications of brown preapical bands on femora; tarsal claws and joints brown (legs entirely white except for an occasional brown tarsal joint in alcoholic specimens). Abdominal tergites very pale brownish-white with a broad longitudinal median brown band interrupted by a narrow median pale line; also narrow submarginal brown streaks (not always present in alcoholic specimens). Sternites entirely white except for irregular submedian brown streaks. (In alcoholic material especially, the sternites and lateral aspects of the tergites are very similar in color, being nearly white). Forceps white; caudal filaments white except for very faint tinge of reddish-brown at base and a tendency toward yellowish joints.

Female: Head brownish-red (white, in alcoholic specimens, with reddish marks above the antennæ and at the back of the head). Eyes piceous. Body uniformly testaceous speckled with reddish-brown, except for deeper brown areas dorsally. (In alcoholic specimens, the body is entirely white except for a broad median pale smoky-brown band extending the length of the dorsum and with a paler median line as in the male). Legs similar to body in basic color, minutely irrorated with dull brown and with a line of larger brown spots along the front surface of femora; fore femora each with a thin brown line extending most of its length on the posterior surface; (in alcoholic specimens, legs entirely white without these brown spots and lines); tarsal joints deeper brown; claws black. Wings hyaline; longitudinal veins intermittently brown and white; cross veins all white, intermediate in number (about 30-35 behind Radius I). Vitta extremely variable but always discontinuous and very irregular; pale, smoky-brown except where it contacts longitudinal veins basally; in these spots it is deep brown; hyaline spots in costal and subcostal spaces numerous to dominant; vitta broader basally. Caudal filaments reddish-yellow, slightly deeper at base.

Holotype: (Dried male imago) No. 4352, C. A. S. Ent., July, 1936; Kingsburg, Fresno County, California, Upholt, collector. Allotype: (Dried female imago) No. 4353, C. A. S. Ent., and the following series of paratypes: (Alcoholic) 5 male imagoes, 10 female imagoes, (dried) 11 male imagoes, 15 female imagoes. Same data as holotype, in collection of California Academy of Sciences, J. R. Traver, and the author.

This species may be distinguished from *fluctuans* Walsh by its more reddish-yellow color and more plentiful cross veins. It is probably very close to *montanus* Eaton but differs markedly in the discontinuous nature of the vitta and in the coloring and number of cross veins. Dr. Traver has doubtfully associated a

specimen in her collection from San Angelo, Texas, with this species. I take great pleasure in naming this species for Dr. Jay R. Traver, of Cornell University, in appreciation of the kind and invaluable assistance and encouragement she has given me throughout my brief study of western ephemerids.

A NEW RACE OF PLEBEIUS SCUDDERII

BY FRANK CLAY CROSS

Plebeius scudderii ricei Cross, subsp. nov.

Expanse: 28 to 29 mm. Holotype, male; upper side of wings, purplish blue with a greenish cast when viewed aslant. Fringes white with a narrow, dark brown, or blackish band bounding them inwardly. Allotype, female; upper side of wings, brown with a coppery glint. Fringes and marginal band as of the male. Two very faint and ill defined yellowish crescents on the secondaries, near the anal angle.

On the under side the wings of both sexes are a dusty, whitish gray. The submarginal yellow crescents, typical of *scudderii*, are either obsolescent or entirely absent in most specimens. Among twelve types on which the race is founded, four lack these crescents entirely, five have them very faintly discernible, and only three have them in more conspicuous evidence. The discal and basal black spots on the secondaries are usually very small, or sometimes, like the crescents, altogether lacking, leaving the wing immaculate. The spots on the forewings, however, are always present though much reduced in size.

This race of *scudderii* is obviously quite variable, but the predominant form tends to lose all its markings. Among seven females, three have no crescents at all discernible on the upper side of the secondaries (both wings are a uniform brown); three others exhibit them very faintly; and only one shows them at all clearly.

The twelve type specimens were taken in August, 1936, in the vicinity of Big Cultus Lake, Oregon, by Mr. Harold E. Rice, of Eugene, for whom the race is named. Holotype, allotype and eight paratypes in the author's collection in the Colorado Museum of Natural History; two paratypes go to the California Academy of Sciences.

THE JONES COLLECTION OF THYSANOPTERA

BY STANLEY F. BAILEY

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In 1912 Paul R. Jones published (4) descriptions of thirteen species of thrips of which two, *Thrips femoralis* and *Phlœothrips jennei*, were from Georgia and the remainder from California. These species of Jones are listed below with their synonymy.

1. AEOLOTHRIPS NASTURTII Jones, 1912, pp. 2-3, pl. I, figs. 1-4.
   - 1927. *Aeolothrips tuolumnei* Moulton, Bull. Brookl. Ent. Soc., 22:187.
   - 1935. *Aeolothrips tuolumnei* Bailey, Pan-Pac. Ent., 11: 164.
2. MICROCEPHALOTHRIPS ABDOMINALIS (Crawford), 1910.
   - 1910. *Thrips abdominalis* Crawford, Pomona Coll. Jl. Ent., 2:157-159, fig. 65, A-E.
   - 1912. *Thrips femoralis* Jones, pp. 4-5, pl. I, figs. 5-8.
   - 1912. *Thrips abdominalis* (=*femoralis*), Hood, Proc. Biol. Soc. Wash., 25:62.
   - 1923. *Thrips microcephalus* Priesner, Ent. Mitt., 12:116-117, fig. 7 (p. 120).
   - 1926. *Paraphysopus burnsi* Girault, Insec. Inscit. Menstr., 14:188.
   - 1926. *Microcephalothrips abdominalis* Bagnall, Ann. Mag. Nat. Hist., ser. 9, 18:98, 113-114, July.
   - 1926. *Thrips* (*Ctenothripella* Pr.) *gillettei* Moulton, Trans. Am. Ent. Soc., 52:126-127, pl. 6, figs. 14-17, July 22.
   - 1926. *Stylothrips brevipalpis* Karny, Mem. Dept. Agr. India, 9:206-208, fig. 10, pl. 19, fig. 4, Sept.
   - 1929. *Thrips* (*Microcephalothrips*) *abdominalis* (=*T. gillettei* Mltn.), Moulton, Bull. Brookl. Ent. Soc., 24:236.
   - 1934. *Stylothrips brevipalpus* (=*Paraphysopus burnsi*), Kelly and Mayne, Australian thrips, pp. 20-21.*
3. SERICOTHRIPS ALBUS Jones, 1912, pp. 6-7, pl. II, figs. 2-5.
4. SERICOTHRIPS MOULTONI Jones, 1912, pp. 7-8, pl. II, figs. 6-9.
5. LIMOTHRIPS ANGULICORNIS Jablonowski, 1894, Thys. Nova., Term. Fuz., 17:2.
   - 1912. *Limothrips setariæ* Jones, pp. 8-10, pl. III, figs. 1-5.
6. MYCTEROTHRIPS LONGIROSTRUM (Jones), 1912.
   - 1912. *Euthrips longirostrum* Jones, pp. 12-13, pl. III, figs. 6-9.
   - 1921. *Mycterothrips longirostrum* Karny, Treubia, 1:216.

*The writer has not seen this reference.

1923. *Mycterothrips longirostrum* Watson, Univ. Fla. Bull., 168, p. 45.

7. TÆNIOTHRIPS COSTALIS (Jones), 1912.

1912. *Euthrips costalis* Jones, pp. 13-14, pl. IV, figs. 1-4.

1923. *Tæniothrips costalis* Watson, Univ. Fla., Bull, 168, p. 42.

8. SCIRTOTHRIPS ALBUS (Jones), 1912.

1912. *Anaphothrips albus* Jones, pp. 16-17, pl. IV, figs. 5-8.

1923. *Scirtothrips albus* Watson, Univ. Fla., Bull. 168, p. 33.

9. HAPLOTHRIPS FASCICULATUS (Crawford), 1909.

1909. *Phyllothrips fasciculata* Crawford, Pomona Coll. Jl. Ent., 1:105-108.

1909. *Phyllothrips fasciculata* var. *stenoceps* Crawford, *ibid.*, p. 108.

1912. *Anthothrips nigricornis* Jones, pp. 17-18, pl. V, figs. 1-4.

1912. *Haplothrips jonesii* Karny, Zool. Ann., 4:344.

1913. *Leptothrips russelli* Morgan, Proc. U. S. Natl. Mus., 46:39.

1918-21. *Haplothrips jonesii* Hood, Mem. Queensland Mus., 6-7,:121-150.

1927. *Haplothrips fasciculatus* Hood, Pan-Pac. Ent., 3:174-175.

10 and 11. KARNYOTHRIPS FLAVIPES (Jones), 1912.

1912. *Anthothrips flavipes* Jones, p. 18-19, pl. V, figs. 5-7.

1912. *Cryptothrips salicis* Jones, p. 20-21, pl. VI, figs. 1-3.

1913. *Haplothrips ceylonicus* Schmutz, Sitz. Acad. Wiss. Wien, Math.-Natur. Kl., Bd. CXXII, Abt. I, pp. 1033, 1038.

1915. *Zygothrips pullus* Hood and Williams, Jl. N.Y. Ent. Soc., 23:127.

1922. *Karnyia weigeli* Watson, Fla. Ent., 6-7.

1923. *Karnyothrips weigeli* (Watson), Univ. Fla., Bull. 168, p. 70.

1923. *Haplothrips harnedi* Watson, Fla. Ent., 6:45.

1923. *Haplothrips oneco* Watson, Univ. Fla., Bull, 168, pp. 58, 60.

1927. *Karnyothrips flavipes* Hood, Pan-Pac. Ent., 3:176-177.

12. HOPLANDROTHRIPS JENNEI (Jones), 1912.

1912. *Phlœothrips jennei* Jones, pp. 21-22, pl. VI, figs. 4-6.

1913. *Phlœothrips floridensis* Watson, Ent. News, 24:147.

1923. *Hoplandrothrips jennei* Watson, Univ. Fla., Bull. 168, p. 50.

1927. *Hoplandrothrips jennei* Hood, Ent. News, 38:113.

13. HOPLANDROTHRIPS ARMIGER (Jones), 1912.

1912. *Phlœothrips armiger* Jones, pp. 23-24, pl. VII, figs. 1-4.

1923. *Hoplandrothrips armiger* Watson, Univ. Fla., Bull. 168, p. 50.

During the course of the investigations of the pear (1, 2) and citrus thrips (3) in California by the Federal Bureau of Entomology, Mr. Jones collected thrips quite generally from about 1907 to 1912. During this time he sent material to J. D. Hood* of Rochester, New York, who has retained it. Also it is to be noted that Dudley Moulton has classified and numbered many of Jones' specimens. About 1920 the Jones collection was deposited with E. O. Essig at the University of California. It is indeed unfortunate that of the nine valid species the type of only one, *Sericothrips moultoni*, is still to be found in the collection. All attempts on the part of the writer to locate the eight missing types have failed, although it is thought that they are still existent.

Since the writer is making a detailed study of the thrips of California, and since Mr. Jones is no longer working with this group of insects, it was thought desirable to catalog this collection in order to preserve its unity and make the information available to those interested. Through the kindness of Professor Essig, this has been done and the catalog is presented below. The genera have been listed alphabetically for convenience. Unless otherwise stated, the species are from California.

TEREBRANTIA:	*No. Slides*	*Remarks*
Æolothrips kuwanii Moulton	40 (9 ♂'s) (1 larva)	
Æolothrips fasciatus (Linn.)	8	
Æolothrips aureus Moulton	2 (1 ♂)	Paratypes
Æolothrips bicolor Hinds	3	Florida
Anaphothrips obscurus Müller	2	Indiana
Anaphothrips secticornis (Tryb)	32 (3 ♂'s)	
Anaphothrips (=*A. apteris* (Dan) (=*A. stanfordii* Moulton?)		
Anaphothrips zeæ Moulton	5 (1 wingless)	

* Hood, J. D. 1927. On the synonymy of some Thysanoptera occurring in California. Pan-Pac. Ent., 3:173-178. 1927. Nineteen synonyms in the North American Thysanopters. Ent. News, 38:112-118.

TEREBRANTIA:	*No. Slides*		*Remarks*
Anaphothrips reticulatus Moulton	23		All stages
Aptinothrips rufus (Gmelin)	13		
Chirothrips sp.	1		Peru
Frankliniella occidentalis (Perg.)	55	(14 ♂'s)	Ariz., Calif., Ore., Wash.
Frankliniella minuta (Moulton)	46	(13 ♂'s)	
Frankliniella moultoni Hood	105	(16 ♂'s)	Ariz., Calif., Wash.
Frankliniella tritici (Fitch)	9	(1 ♂)	Ga., Mich.
Frankliniella insularis Frank	2	(1 ♂)	Texas
Frankliniella fuscus Hinds	2	(1 brachypterous)	N. C., Tenn.
Frankliniella sp.	1		Peru
Heliothrips hæmorrhoidalis (Bché)	6	(1 larva)	Calif., N. Zealand
Hercothrips fasciatus (Perg.)	3		
Heterothrips arisaesmæ Hood	1		Virginia
Leucothrips piercei (Morgan)	2		Tennessee
Limothrips cerealium Haliday	3		Tennessee
Odontothrips loti Haliday	3		
Orothrips kelloggii Moulton	3	(2 ♂'s)	
Parthenothrips dracænæ (Heeger)	2		
Plesiothrips perplexus (Beach)	1		Tennessee
Scirothrips citri (Moulton)	110		All stages, Ariz., Calif.
Scirtothrips albus (Jones)	7	(6 ♂'s)	
Scolothrips sexmaculatus (Perg.)	4		
Selenothrips rubrocintus (Giard)	1		Honolulu
Sericothrips variabilis (Beach)	13		Ariz., Calif.
Sericothrips cingulatus Hinds	1		Tennessee
Sericothrips moultoni Jones	45		Type, & 2 cotypes
Tæniothrips inconsequens (Uzel)	104		All stages; Calif., New York, Pa.
Tæniothrips vulgatissimus Hal. (?)	1	♂	
Thrips tabaci Lind	50		1 slide from Australia
Thrips nigropilosus f. *brachyptera* (Uzel)	1		
Thrips madroni Moulton	43	(17 ♂'s)	
Thrips imaginis Bagnall	2		Australia
Undetermined (mutilated)	1		
TUBULIFERA:			
Aleyrodothrips fasciapennis Fkln.	1		Florida
Bagnalliella yuccæ Hinds	1		Tennessee
Gynaikothrips uzeli Zimm.	2	(1 pupa)	Florida
Haplothrips fasciculatus (Cfd.)	7	(1 ♂)	
Haplothrips malifloris Hood	4		New Mexico
Haplothrips leucanthemi (Schk)	3		Florida, Mont.

TUBULIFERA:

Hoplandrothrips funebris Hood	1	Virginia
Hoplothrips ulmi (Fab.)	1	Pennsylvania
Leptothrips mali (Fitch)	35	Calif., Ga., Ohio, Tenn.
Liothrips mantanus Hood	1	Montana
Neoheegeria verbasci (Osb.)	2	Mich., Tenn.
Rhynchothrips ilex (Moulton)	46 (2 ♂'s)	All stages
Tubuliferous larva (unidentified)	3	Ohio

The published works of P. R. Jones on thrips are listed below.

(1) Foster, S. W., and P. R. Jones.
1911. How to control the pear thrips. U.S.D.A., Bur. Ent., Circ. No. 131, pp. 1-24, Jan. 9.

(2) Foster, S. W., and P. R. Jones.
1915. The life history and habits of the pear thrips in California. U.S.D.A., Bul. No. 173, Prof. Paper, pp. 1-52, Apr. 13.

(3) Jones, P. R., and J. R. Horton.
1911. The orange thrips. A report of progress for the years 1909 and 1910. U.S.D.A., Bur. Ent., Bul. No 99, Part I, pp. 1-16, March 6.

(4) Jones, P. R.
1912. Some new California and Georgia Thysanoptera. U.S.D.A., Bur. Ent., Tech. Ser., No. 23, Part I, pp. 1-24, Jan. 26.

WEEVIL LARVÆ ANNOYING TO HOUSEHOLDERS

A. E. Michelbacher reports that during the early part of April, 1936, numerous larvæ and decently developed adults of a poplar weevil, tentatively identified as *Dorytomus nubiculinus* Casey, were dropping from a large poplar tree on to a house in Sacramento and worming their way into the rooms through the cracks surrounding the screens, much to the annoyance of the owners. This weevil is rather uncommon in this state, having been found previously only at Sacramento and in the mountains of northern Trinity County.—Edwin C. Van Dyke.

A NEW CALIFORNIA OMUS (COLOPTERA-CICINDELIDÆ)

BY MONT A. CAZIER

The following new subspecies of the rare *Omus submetallicus* Horn has been brought to light through the collecting efforts of Mr. Roy S. Wagner to whom the author is greatly indebted.

Omus submetallicus niger Cazier, new subspecies

Narrow, elongate, black, shining. Head slightly narrower than widest portion of prothorax; labrum short, coarsely alutaceous; front coarsely alutaceous, large deep wrinkles and small punctures sparsely scattered over disk. Pronotum as long as broad, widest at anterior eighth, lateral margins well defined, acute; disk and side margins coarsely alutaceous, fine line-like impressions evenly, sparsely scattered over entire area; moderately wide posterior and anterior margins deeply wrinkled; uneven row of large, deep, setigerous punctures extending along outer, middle, margin of disk. Elytra elongate, narrow, parallel, widest just posterior to middle, gradually narrowing to apices and base; lateral margins acute; coarsely alutaceous, shining; uniformly moderately densely punctured throughout, punctures separated by four to five times their own widths; larger, shallower, setigerous punctures sparsely, irregularly placed down center of each elytron; side margins with few scattered setæ. Beneath uniformly black, finely to coarsely alutaceous. Length 14.5 mm., width 5 mm.

Holotype male (No. 4478 C.A.S., Ent.), allotype female No. 4479 C.A.S., Ent.). Holotype from Wartham Canyon, Fresno Co., California, March 26, 1937 (J. H. Blum), allotype from the same canyon, March 18, 1928 (Roy S. Wagner). Described from a series of 29 specimens. Five paratypes in the collection of Roy S. Wagner, nine each in the collections of J. H. Blum and W. H. Nutting who collected 22 of the total number, and four in the authors collection.

This subspecies is closely related to *submetallicus* from which it differs by having both dorsal and ventral surfaces uniformly black in mature specimens, and by the denser sculpturing throughout. The size of most of the specimens in the series is larger than the type of *submetallicus*.

A THIRD NEW SPECIES OF CENTRONOPUS FROM CALIFORNIA

(Coleoptera: Tenebrionidæ.)

BY FRANK E. BLAISDELL, SR.[1]

In 1933,[2] I described two new species of *Centronopus* in addition to the one already known. Recently a fourth species has been discovered, in material submitted for determination by the Department of Entomology of the University of Kansas. In the American species north of Mexico, the specific differential characters are found in the secondary sexual characters. In my Monograph referred to above (p. 214), I gave the characters common to the species of Centronopus and it is not necessary to repeat them here, as the description of the secondary sexual characters is all that is necessary:

Centronopus simplex Blaisdell, new species

Male. Metafemora gradually widened from the base and but feebly inflated in distal one-half; ventral surface of each with an area of pubescence that somewhat resembles that of *wagneri* Blais., but with the hairs longer, more abundant, rather coarse and golden in color, the area extending from near the femoral base to about the middle of the length. The mesofemora have a similar pubescent area, which is shorter and smaller. The metatibiæ have pubescent lines as in *wagneri* with an area of longer hairs.

The protibiæ are straight, a little narrower but similar in form to those of the female, not sinuate on the ventral edge as viewed from the side; ventral surface not grooved but feebly flattened and irregular from small tubercular irregularities, when viewed from the side the edge appears loosely but not strongly tuberculate.

Female. Ventral surface of the metafemora and mesofemora finely margined, not grooved and sparsely setose, the setæ short. Protibiæ not grooved beneath but with a smooth line; rather less widened apically and the ventral surface with short setæ.

Measurements. (Types) Length 19-20 mm.; width 7.5-8.0 mm.

Holotype, male, and allotype, female, in the collection of the Entomological Department of the University of Kansas at Lawrence. Holotype collected July 28, 1928, in the Giant Forest, Tulare County, California, by R. H. Beamer; allotype taken on

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[2] Trans. Am. Ent. Soc., LIX, pp. 191-228.

July 26, same locality, by Paul Oman. Nine specimens studied. Seven paratypes, four in the collection of the University of Kansas; three in that of the author, Museum of the California Academy of Sciences.

Simplex is most closely related to *wagneri* Blais. and can quickly be recognized by the male having the protibiæ unmodified and less widened apically, resembling that of the female. The protibiæ are straight, their ventral surfaces not grooved, the margins loosely tuberculate. The pubescent area on the ventral surfaces of the metafemora is longer and heavier than in *wagneri*. The profemora are only slightly inflated. The labial palpi and apices of the maxillary palpi are rufous.

In *wagneri* the ventral surfaces of the protibiæ are distinctly grooved and the outer or posterior margin of each groove is the most prominent, with four or five irregularly spaced larger tubercules; the less prominent inner or anterior margin is feebly and irregularly subtuberculate. The pubescent area on the ventral surface of each metafemur is located in the middle third, the hairs are coarse, longer and directed apicad, on and from each side of the median plane, the area is narrow basad and gradually widens toward the apex.

In *punctatus* Blais. the protibiæ are quite like those of *wagneri*: broadly sinuate on the ventral surface as viewed from the side. The profemora are distinctly inflated. The ventral surfaces of the metafemora and mesofemora are sparsely punctate, each puncture with a short seta.

In *parallelus* Lec. the pubescent areas of the ventral surfaces of the metafemora and mesofemora consist of dense, short and soft pile, distinctly different from that observed in the other species; besides the protibiæ are more arcuate, the femora are more contracted and subcylindrical basally and the metatibiæ have a larger tuft of pubescence as viewed from behind.

Note

The undersigned finds it necessary for the present to discontinue the identification of Coleoptera. The task demands too much time and interferes too much with other studies he now has on hand.—Frank E. Blaisdell Sr.